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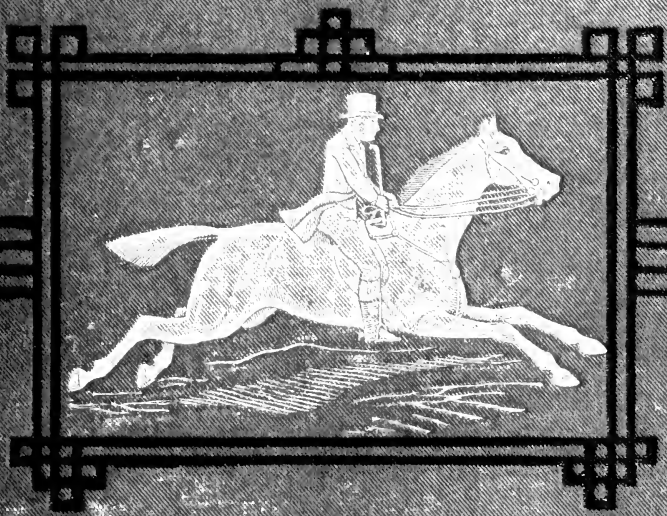

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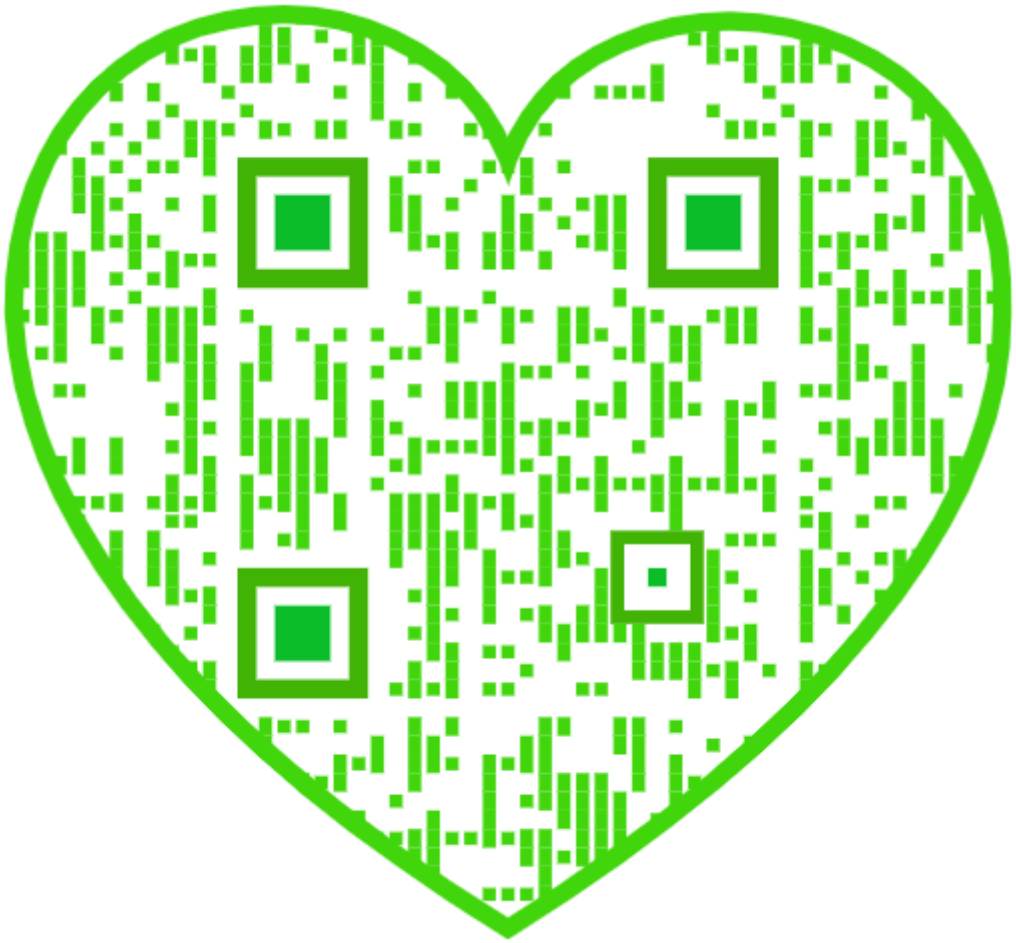

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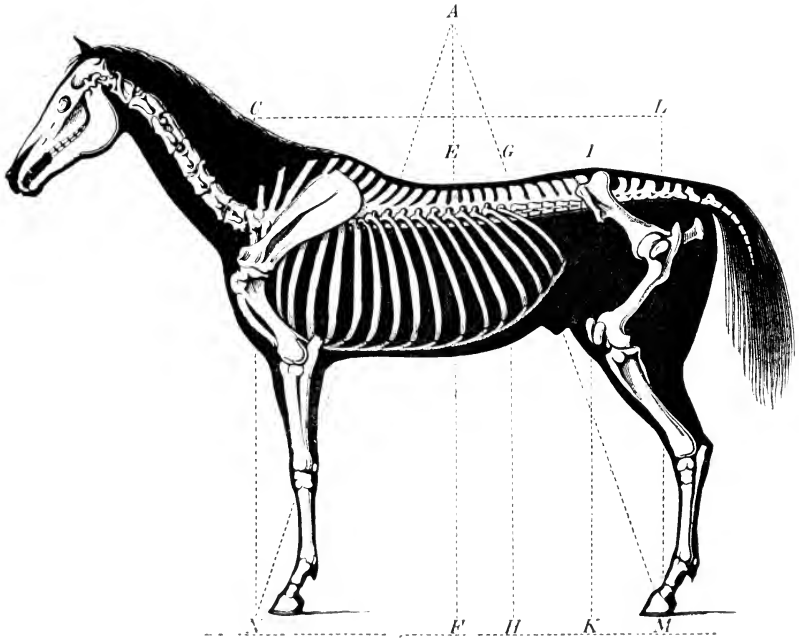

THE FRAMEWORK OF THE MACHINE.

SEATS AND SADDLES

BITS AND BITTING

DRAUGHT AND HARNESS

AND THE

PREVENTION AND CURE OF RESTIVENESS IN HORSES

BY

FRANCIS DWYER

MAJOR OF HUSSARS IN THE IMPERIAL AUSTRIAN SERVICE

Vis consili expers mole ruit sua,"
—HORACE, *Carmin*, Lib. III. Ode vi.

THE THIRD IMPROVED AND ENLARGED EDITION

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TO

HIS SERENE HIGHNESS

FRANCIS PAUL CHARLES LOUIS ALEXANDER,

DUKE OF TECK,

THIS BOOK

IS BY PERMISSION DEDICATED,

IN GRATEFUL ACKNOWLEDGMENT

OF MANY KINDNESSES

SHOWN TO HIS SERENE HIGHNESS'S

MOST OBEDIENT SERVANT,

THE AUTHOR.

PREFACE TO THIRD EDITION.

THE second edition of this book having been exhausted for some time, and the public still continuing to ask for copies, a third edition has been prepared. In Part I., chapter II., some additional remarks are offered on the subject of the crupper for cavalry saddles. In Part II., chapter I., the author enters a protest against the notion of his having ever advocated any one shape or size of bit as being universally applicable. In Part III., chapter III., Fehrmann's Horse-saver (Fferde Shconer) is described, and its use explained. There are also some remarks on brakes, on the disadvantage of depending on the crupper in draught, for mares or horses inclined to kick; on long breechings, and on the uses and abuses of the bearing-rein; the latter arising from its being employed to make a display, the former being however very real, if properly understood and carried out.

F. D.

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INTRODUCTORY CHAPTER.

It may be well, at starting, to state the objects with which this little book has been brought before the public interested in horses, and at the same time, in order to prevent misapprehension, to say that the author has not the slightest intention of setting up any one kind of seat or style of riding as a model for all riders. On the contrary, he is fully persuaded that each of these has its own merits, and, as our French neighbours would say, its own *raison d'ètre*—that is to say, has been adopted for good and sufficient reasons, so far as each individual rider possessed an insight into the true essentials of the case, and has been able to distinguish these from what is merely matter of fashion or supposed convenience.

Some men, and these are the naturally good or born riders, possess the sort of knowledge in question instinctively, and frequently without being able to account either to themselves or others for the way in which they have acquired it, or give satisfactory reasons for the adoption of their methods. Such men are most usually, although not invariably, of the pecu-

that we know of. No doubt we demand a greater amount of hard work from our horses than other people; still broken knees are the opprobrium of the rider, and point very evidently to great ignorance or total disregard of the very simple mechanical principles that govern the motion of a quadruped with or without a burden on its back. Every one knows that the best constructed form or chair may be upset by sitting awkwardly on it and setting the laws of gravitation at defiance; whilst few people who have knocked down their valuable horses by precisely the same process seem to be in the least aware of what they have really done: "the brute stumbled and broke both his knees," is the only explanation they are capable of affording; of course it is never their own fault.

Again, how many horses, especially young ones, are made restive, and become plungers, bolters, or rearers, through the intolerable pain occasioned by bits that are wholly unsuited to their mouths, and sometimes fitter for a rhinoceros than so sensitive and delicate an animal as the horse. Many a curb, stringhalt, and spavin, are originated by the use, or rather abuse, of bits whose lever power is so excessive that it is impossible to regulate their action, not to mention the very numerous instances in which bits are placed in such a position in the horse's mouth as to act on the animal's head in exactly the opposite direction to that intended by the rider, as shall be hereafter explained; and thus in conjunction with the misplaced burden of the rider, assist in throwing down the bearer.

It is well known that a very great and constantly-increasing number of English saddle-horses are annually exported to Berlin, Vienna, Paris, and other

great Continental cities, and many of these are there sold at prices perfectly remunerative to the dealers, but which are much lower than animals of equally good figure and proportions command with ease in the English market. This was for a time a puzzle to the Continentals, and even to some amateur dealers, who made bad speculations in consequence. By-and-by it was discovered that a great majority of these splendid animals were either more or less restive, or at least "difficult," as the phrase goes. Being frequently purchased by military officers of superior rank, they were naturally put into the riding-schools, where they gave so much trouble that many professionals were led to believe that English horses were incapable of any high degree of school-training. Others who were more judicious found it impossible to reconcile the well-known docility of the English breed with the fractiousness and intractability of these exported specimens, and came to the very sound conclusion that the fault lay, not in the breed, but in the previous injudicious handling of these individuals. Baucher, the French riding-master, founded his great reputation,—which, by the way, has been much exaggerated,—on his successful conversion of the celebrated Partisan—an English horse that was sold for a song, because nobody could manage him—into a first-rate and most docile school-horse. Some of the Germans, however, decided the question in a still more positive manner, by buying young high-bred horses in England that had never been backed; and Seeger, Von Oeynhausen, and other first-rate authorities, now all state that English horses are just as capable of high training as all others, and more so than the Arabians, who have a very peculiar trot.

It is incontestable that the English, as a nation, possess in a high degree the physical and moral qualifications that go to make good riders. Where, then, can the fault lie? Evidently in something connected with the mechanism employed in enabling the horse to carry its rider, and the rider to maintain his seat and preserve the mastery over his bearer; in other words, something *peculiar in saddles and seats, bits and bitting.*

It will perhaps seem to many persons impossible, or at least improbable, that mere saddles and bridles, or the manner in which they are adjusted to the horse's body, can produce such very material results as those suggested here. Well, it does seem strange; but let us listen before passing judgment on the case, to some documentary evidence bearing upon it. On the 20th May 1859, the French cavalry had in Piedmont 9008 effective horses, increased subsequently by the arrival of a whole brigade (Perouse), so that on the 24th June (Solferino), the total number borne on the lists was 10,206.* But it subsequently transpired, from the report of the Cavalry Commission ordered by Marshal Randon to inquire into the causes of the tear and wear of horses during the campaign, that, on the day of that decisive battle, not more than about 3500 horses were really fit for service, the remainder having been disabled by less than one month's marching; for, with the exception of one or two squadrons that fought at Magenta, the French cavalry was never under fire up to the 24th June, and an immense proportion of these had been rendered unserviceable by the *saddle* and other portions of the equipment.

* 'Campagne de l'Empereur Napoleon III. en Italie en 1859' (official.)

Most of us, too, have heard of what happened to that portion of our own cavalry that was employed in the reconnoitring expedition into the Dobrudscha. A proverb current amongst the Continental military men says, that more men are put *hors de combat* by the calfskin (the knapsack) than by either bullet or bayonet; and there seems good reason to believe that the pigskin stands in the same fatal relation to horses.

There is no lack of books in which very full and particular descriptions of model seats on horseback may be found, nor of riding-masters who both know how to sit a horse themselves, and impart to their pupils their own particular method. But this will not answer the purpose; for there exists not only a certain number of typical seats, more or less suited to various ends—as racing, hunting, the cavalry service, &c., all of which, as has been said, have their peculiar justification—but there is also a great variety in the build of horses, and especially in the relative power of their fore and hind quarters, which demands consideration, if we would avoid the serious and but too common error of using up one set of members prematurely whilst leaving the others intact. For instance, nothing is more frequent amongst ourselves than to see horses otherwise perfectly sound, irreparably ruined in the fore legs.

Moreover, there exists an equal variety in the build of the riders, which also requires consideration. Dr. Heavysterne cannot be expected to sit his horse as Mr. Threadpaper can do, nor a well "split up" man like one that is built on the lines of an otter; nevertheless there is no reason why each and all of them should not sit *well* and judiciously, though their seats must be necessarily different. There is only one class of riders

from which one must and can demand a great degree of uniformity, namely, cavalry. The necessity arises from the existence of a special and narrowly-defined object being to be attained—the possibility, from the fact of both men and horses being selected with reference to this very object. But even here a certain margin is inevitable. It is not possible to make the Indo-Germanic Prussians, Bavarians, French, English, or Irish, sit on horseback exactly like the Mongolian Magyars and Turks, or the Semitic Arabs. Professor Max Müller and the author of the Adamites seem to have overlooked this interesting fact. Still, the mutual relations of the frameworks of the man and of the horse are such as to admit of one general principle being set up, and this *must* be adhered to as closely as possible if the real end and object are not to be sacrificed to fashion or prejudice.

It is more difficult to lay down anything like a principle for the guidance of that large class of men who ride simply for pleasure, convenience, or health. To one considerable section of them the notion of sitting their horses as a riding-master is supposed to do would be simply disgusting; it would look like an affectation, a sort of thing to which well-bred gentlemen have a great objection. They can afford to ride tolerably safe horses, and depend on their saddler and groom to a great extent for the convenience and comfort of their seat. These important functionaries must be often sadly puzzled how to insure this, and would be probably often delighted to find their employer capable of giving them some intelligible hint on which they might exercise their ingenuity and *savoir faire* with a decent chance of success.

The next section comprises those who are indifferent to appearances, and merely desire to ride safely and comfortably. As regards the latter point we may refer them to what has been just said; and as to the matter of safety, this will be perhaps better attained by some knowledge of where the danger lies, and how it may be avoided, than by a practical experience of it in the shape of a fall.

Others again, although they never followed a hound, nor are likely to do so, adopt what they believe to be "a hunting seat" merely because it is a prominent type, and therefore caught their eye more readily than the chaos that presented itself in all other directions. Many of them would doubtless adopt with equal readiness some other form that promised equal or greater security and convenience, especially if they should happen to discover, by the aid of a looking-glass, that their copy is somewhat too much of a caricature.

The aim of this little treatise is therefore, by appealing to the intelligence, common sense, and good feeling of all riding men, to enable each to discover for himself what best suits his own peculiar case, and will put him in a position to make the best and the most of every horse he may have to ride, in the safest manner, so far at least as the matters herein treated are concerned. The intention is to refrain from all dogmatism and authoritative assertions, and merely present general principles, derived from mechanical laws that admit of no controversy, showing their inevitable bearing on the most important points, and leaving the reader as much as possible to form his own judgment independently, and arrive at a practical application for himself. The work is therefore not intended

to represent a treatise on equitation or the art of riding, but merely to be a plain and easily intelligible exposition of the mechanical problems connected with the case of a quadruped serving as a bearer to a biped—in other words, of a horse under its rider.

The plan to be adopted will be, first, as regards "Seats and Saddles," as follows: The horse's skeleton is a framework forming the basis of the living machine we employ as a bearer; it is therefore necessary to know something of its construction, less from an anatomical than a mechanical point of view. The principles involved are very simple, and familiar to most people in one way or the other, regarding chiefly equilibrium—that is to say, such a distribution of a weight with reference to its supports as insures stability, or, in other words, prevents its upsetting or falling; also something about levers.

The chief weight to be carried by the machine is, of course, the rider, whose seat should therefore be so adjusted as not to interfere with the free action of the bearer and the preservation of its stability and equilibrium. But as the seat depends to a great extent on the saddle, it becomes necessary to examine, in the first place, the general principles of construction of this mechanical contrivance, by means of which the twofold object of securing the free action of the horse and the safety of the rider may be best attained. This will be found to depend partly on the absolute amount of surface coming in contact on the one hand with the horse's back, on the other with the rider's seat; partly on the way in which the weight of the latter is adjusted on the saddle—that is to say, whether it presses more on one part than on another, and consequently,

chiefly on one or two points of the horse's back, or whether it be distributed equably over the whole surface in contact with the latter,—in other words, what part of the saddle the rider should occupy in order to secure the object he has in view, as stated above. It will further depend on the general shape of those parts of its under and upper surfaces that come in contact with the horse's back and rider's seat respectively, which, of course, includes the question of its proper place, its mode of attachment—that is to say, where and how the girths should be fixed—and the causes of its displacement, which depend partly on its own shape favouring, partly on the rider's seat producing, lever action, which again depends to a great extent on the exact point from which the stirrups are suspended.

This will furnish data for an estimate, not so much of the relative value of different kinds of seats —which would only divert attention from the real object, and provoke controversy—as of their absolute fitness for the particular purpose they are intended to fulfil; and will also afford an opportunity of pointing out the danger of exaggerations, and the gross absurdity of applying a style of riding more or less specially adapted to one purpose, to others that have no analogy with it; in fact, it will be shown that different styles of riding are not only inevitable but legitimate, because the ends to be attained vary considerably. But at the same time, although the general principles may be adapted to circumstances, they can never be absolutely violated with impunity. Let each particular style of riding be as perfect in itself as possible without being made antagonistic to others, or losing sight of the general conditions that apply to all

without exception. There is a great value in schools; for, making due allowance for individuality, they enable us to form a correct estimate of what the scholars can do. For instance, in "welters" we impose penalties on professional jocks, because we know that they have been trained in a certain school; whereas we have no standard of comparison for gentlemen-riders.

It is proposed to illustrate this portion of the book with drawings of horsemen, representing various styles of European and Asiatic riding, taken from portraits, photographs, and pictures executed by artists who had no preconceived theories to bolster up, and picked. nearly at random from such materials as were available They will be found to confirm, in a remarkable manner, the truth of the general principles laid down, as well by their discrepancies as their points of resemblance, and will no doubt prove interesting to many readers in other respects.

The European cavalry soldier is compelled to put on his horse's back, in addition to his own weight and that of the saddle, the extra burden of a huge pack of things forming his kit. It is obvious that the most careful adjustment of the rider and saddle to the general equilibrium of himself and horse will avail little if the balance be destroyed from the moment the pack is put on; nor will it do to make this merely a counterpoise to the rider, because he is frequently required to ride either in an empty saddle or with various amounts of pack, therefore the equilibrium must be at all times maintainable, whatever the absolute weight may be. The neglect of this is one of the main causes of the sore-back disasters that usually occur at the commencement of a campaign, and, to the great astonishment

of the uninitiated, frequently nearly disappear in the further course of it.

There is another great difference between the conditions under which the soldier and the civilian mount their horses, the former being compelled to ride with one hand, and have the other free to use his weapons; besides, his life frequently depends on a rapid change of direction at various degrees of speed, and which he must be able to effect without great effort. The way in which the pack is placed on the saddle has much to do with this, as will appear when we come to the subject of "Bits and Bitting." All these matters shall be treated in a separate chapter, and illustrated by figures.

The second part of the work is devoted to "Bits and Bitting." There is much more in this than most people may be willing to believe. A ship with a damaged or badly-constructed and ill-fitting rudder is not more awkward and difficult to manage than a horse with a bit that is not perfectly adapted to his mouth and his whole frame, or which has been ill placed. It will be necessary here to refer again to the horse's skeleton, and point out the beautiful series of levers, and the wonderful lever action, by means of which, in conjunction with the seat and legs of the rider, his will may be conveyed from his little finger through the reins, bit, head, and neck of the horse, down to the very last joint of its hind legs, in the, to the animal, most unmistakable and peremptory manner.

Although bitting finds its place here after saddling, this is not because of its being a secondary consideration, but rather because no man can have a light hand, or, in fact, use any bit properly, unless he have so

steady and close a seat as to put all suspicion of what is technically termed "rein-riding" out of the question. This self-same rein-riding—that is, the depending to any extent on the reins for maintaining the seat—is but too common, and a frequent cause of restiveness in horses, and no end of disasters to riders. It must be admitted that a certain exaggerated method of rising in the stirrups and totally abandoning all contact with the saddle, in which Sunday and holiday riders so much delight, conduces very directly to this. Of course no good rider cares to perform this description of equestrian antic; still it is sufficiently common, even amongst men who should know better, to demand attention, and is noticed here for the sake of illustrating the close connection that exists between bitting and saddling.

The mechanical principles on which the action of the bit depends form the first subject of inquiry. Then we shall have to examine into the internal and external conformation of the horse's mouth to which this instrument is applied; we shall thence be enabled to deduce the dimensions of the several parts of the bit, and also ascertain its proper place. Some few of these dimensions are nearly constant—others, again, are variable, and the proper means for ascertaining them shall be pointed out. The use of the snaffle, the running-reins, the nose-band, and other contrivances, demands some attention, as also the real and supposed advantages of various kinds of bits.

The third part is devoted to the very important questions of "Draught and Harness." We have, in the first place, endeavoured to show, that although the mechanical rules applied to the traction of machines

are in themselves perfectly correct, they do not admit of too rigid an application to the horse as a motor. In fact it is less a question of determining in what direction and under what angle the power can be most advantageously applied to a wheeled vehicle; than, in what direction and under what angle can the horse exert his power of traction with least inconvenience and fatigue to himself. And the consideration of this question naturally led to an examination of the collar, the hames, the trace, the pole and pole-chains, and the wheel itself, as the most important parts of the harness and carriage, as far as the best mode of utilising the horse's power is concerned.

The fourth and last part of the book is devoted to the "Prevention and Cure of Restiveness." Violent measures are seldom successful for the latter purpose, and more likely to produce than to prevent insubordination. In fact, what is generally required is a complete course of re-training, under circumstances different from those under which the restiveness is usually exhibited. The question then arises, On what system this re-training should be undertaken—the usual English one, or some modification of the school method? The first named, taken alone, is inadequate to the purpose; if for no other reason, from being generally carried out on the roads, fields, &c.—that is to say, just where provocation and opportunity for conflicts present themselves at every corner. Nevertheless, it has its own peculiar advantages, which should be utilised. The school method is much better adapted for the correction of restiveness, because it affords more direct and efficient means for acquiring perfect control over the horse's movements. It is, however, from a

judicious combination of the two systems that the best results may be hoped for. We shall, therefore, give first a general sketch of the principles of both, pointing out as we proceed how each may be best applied for the object in view, as also for that of getting over difficulties with horses that are restive. We shall next lay down the outlines of a method applicable in nearly all cases of insubordination; and, finally, specify for some particular forms of restiveness the treatment that promises the best results; as also what should be avoided—for very much depends on this. In a word, we propose showing that a rational methodical treatment of what is called vice offers much better chances of success than violent measures: and with this general statement of the aim and object of this treatise we now conclude our introductory chapter.

PART ONE.

SEATS AND SADDLES.

CHAPTER I.

THE FRAMEWORK OF THE HORSE CONSIDERED FROM A MECHANICAL POINT OF VIEW.

THE skeleton of the horse is a very wonderful and beautiful piece of mechanism, which no one who takes an interest in such matters can contemplate without experiencing the pleasurable feeling that perfect harmony of proportion always inspires. We were about to add, fitness and adaptability to our purposes, but remembered, just in proper time, that this would be, after all, a very incorrect mode of expression; for, in truth, what is highly desirable is, that we should limit and adapt our requirements to the capabilities of this mechanism, and not simply to our own convenience, which but too frequently leads to abuse, as we shall now proceed to show.

The horse depicted in Plate I.* is of an average description, and stands in a natural position, its head and neck stretched forwards, and the hind legs, instead of being perfectly perpendicular from the hocks downwards, slightly brought forward to assist in maintaining the equilibrium. The animal is *at rest;* there is nothing constrained in its attitude; but the eye tells us at once that a somewhat greater proportion of its weight

* Taken from Seeger's 'System der Reitkunst.'

rests on the fore legs than on the hind ones, owing, as one sees, to the projecting position of the head and neck, which are much heavier than the tail at the other extremity.

Looking now at the spinal column, the framework of the back, on which the rider's weight is to be placed, we perceive that, whilst the under line of the vertebræ is nearly straight, although not quite horizontal, inclining somewhat downwards towards the forehand, the spinal processes of the first thirteen vertebræ of the back (dorsal vertebræ), reckoning from the point where the neck is attached, incline backwards, whereas those of the fifteenth, sixteenth, seventeenth, and eighteenth dorsal, and the six lumbar vertebræ, incline forwards; the fourteenth dorsal vertebræ, with its process, standing perfectly upright, and forming, as it were, the keystone of the arch thus presented. It is very obvious that this inclination of the processes towards a central point is intended to and does limit the motion of the back downwards and upwards (*i.e.*, vertically), so that, in fact, this fourteenth dorsal vertebra becomes the *centre of motion of the horse's body*—the point about which the several movements of the fore and hind legs are performed with various degrees of rapidity, either simultaneously or successively, and which constitute the paces of the horse; and this is further shown by the distribution and points of attachment of the muscles of the back and adjacent parts of the fore and hind quarters. Putting, therefore, the progressive movement of the animal out of the question as being equally applicable to all its parts, the internal motion of the several parts of the body increases in proportion to their distance from the fourteenth vertebra; *and the*

same is applicable to burdens placed on the horse's back, especially a rider, whose frame is subject to its own peculiar motions, some of which are caused by the progressive movement of the bearer.

It has been already pointed out, that in consequence of the projecting position of the head and neck, especially when the horse stands at ease, a somewhat greater proportion of its total weight falls on the fore legs than on the hinder ones; and when it depresses its head still more than is represented in Plate I.—for instance, for the purpose of grazing—the animal puts forward one fore leg, and usually at the same time the hind leg of the opposite side, for the purpose of securing its equilibrium; and even horses standing still, especially under a load, do the same, in order to rest each pair of legs alternately.

We learn two facts from this: first, that the fore legs are essentially bearers, and that the hinder ones, although chiefly propellers, are also to a certain extent bearers; and, secondly, that a perpendicular line falling through the centre of gravity of a horse, as here represented, would lie nearer to the shoulder than the perpendicular E F, which falls through the centre of motion —that is, the fourteenth dorsal vertebra—and would probably cut the twelfth, or perhaps the eleventh, in some horses. Now, instead of going into the scientific detail of centres of gravity, which might prove difficult to some and tedious to most readers, we shall endeavour to render intelligible all that is really important to be known, by a very simple experiment that any one can repeat for themselves. *a b c d*, fig. 1, represents a piece of thin board 9 inches long by 4 inches wide, at whose corners four legs of about 7½ inches long are

fixed on with one screw each, so as to allow them to be moved either to front or rear, but sufficiently tight to retain them in the position in which they are placed. A small weight is then placed exactly on the centre point of the board at *p*, the four legs being ad-

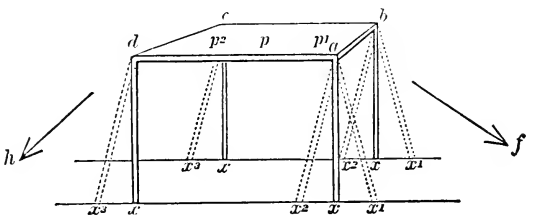


Fig. 1.

justed square, as at *x x x x*. If the weight be not so heavy as to overcome the slight friction of the heads of the screws, the board will remain in its position—that is, it will stand; but if it be removed towards one end of the board, say to p^1 it will cause the board to turn on the screwheads, and, if not prevented, slide down towards *f*; but if the two legs at this end be bent backwards to x^1 x^1, the board will support the weight as before. In like manner, if the weight be removed in the other direction to p^2, the legs being square, the same thing will occur, and the board will turn on its legs and slide down towards *h*, which, however, may be prevented by adjusting the same pair of legs as before, and which here represent the hind legs of the horse, to the position x^2 x^2, and in both these cases the board will assume a slanting position, in which the end *a b* will be lower. Or, the weight being at p^2, the board may be made to stand by adjusting the *other pair* of legs, representing the horse's fore legs, to

the position x^2 x^3, and in this case it will slant the other way, the end *c d* being lower.

Now this is just what takes place when a rider is put on a horse's back in analogous positions, leaving out of the question for the moment the influence of the overhanging head and neck on the stability of the machine. Referring back to Plate I., we see, in fact, that the points *a* and *d* of the board correspond with the hip and shoulder joints A and D on the one side of the horse, as *b* and *c* do with the same joints on the other, and these are the two points of support of the back, whilst *p* corresponds with the fourteenth vertebra at E; and, still leaving the head and neck out of the question, the rider placed here would sit not only *directly over the centre of motion, but also over the centre of gravity*—that is to say, a central point equally removed from each of its four supporting points;* he would occupy the apex or summit of a regular pyramid, the most stable of all forms of construction.

Let us now suppose the rider, or the weight, whatever it may consist of, placed farther back towards the horse's

* It is to be remarked that the points on which the horse's feet stand seldom coincide exactly—that is, lie precisely *under* the shoulder, and hip joints respectively. The fore feet especially seldom reach, even with the toes, the perpendiculars from the shoulder-joints. With Eclipse they did so naturally, with tolerably well-built horses moderately "set up" they will generally do so; and if the setting-up is carried beyond a certain point, they not only reach but project before them, the two hind feet either following proportionately in the same direction, or going to the rear, as may be seen when the horse-dealer "stretches a horse," in order to show how much ground it covers. There is a great difference, too, between the jointed flexible legs of a horse, and the rigid straight ones represented in fig. 1. An animal always exerts a certain amount of muscular action to maintain its balance even when resting.

loins, corresponding to the point p^1 of fig. 1. What does the horse do, if compelled to stand still under a burden that is more than his hind legs can easily support with perpendicular hocks? Let the reader turn to Plate VII. where the English hussar there presented shows the horse extending his hind legs precisely in the way indicated in fig. 1, x^1 x^1. What between the rider sitting at the hinder part of the saddle and the weight of the enormous pack, the perpendicular passing through the centre of gravity of the whole falls considerably in rear of the fourteenth vertebra. This figure is photographed from life, and is very instructive. The horse, certainly not a fair specimen of the regiment or of the cavalry in general, was selected, probably, for no other reason than because he could be easily brought to stand still during the operation; and the clearness of the lines of the original everywhere except about the head, which he probably tossed once or twice, shows that he did so, which was rendered possible, under the burden he had to bear, and the mode in which it was placed on his back, *only* by this very position of his hind legs; he *could not* stand straight under it, and the less so because his hind quarters are weaker in proportion than the forehand. The position of the head and neck has much to do with it, but this we shall have to consider further on.

The cases in which a horse, when standing still, and weighted *chiefly* on his forehand, assumes with his fore legs the positions indicated in fig. 1 by x^3 x^3 or x^2 x^2, occur so frequently that it is quite superfluous to devote a figure to their illustration. Put a man on a horse without a saddle, and with nothing but a halter on the animal's head, and he will inevitably slip for-

wards till his seat comes in contact with the withers. Let him then stand still, and the horse, especially if a young or untrained one, will most probably shove forward his hind or fore legs in one of these two ways.

There remains a third case for consideration—namely, where the horse, being weighted back to the line G H, Plate I., brings his hind legs under him up to the line I K, *but with the hocks bent.* This is the position into which manege-horses have to be brought for certain definite purposes, the general object being to enable them to make short turns on the hind quarters or croup, the forehand turning round this latter; whereas, with a horse weighted on the centre line E F; Plate I., the hind and fore quarters both turn equally round a common point, and with one weighted principally on the forehand, the hind quarters will turn round the former.

Now, in order to avoid drawing false conclusions from these facts, we must take another view of the question. What we have hitherto inquired into is, the effect of certain modes of distributing the weight on a horse's back when in a state of rest on the position of his legs with regard to that weight; but the really important thing to know is, how these various modes influence the horse's action. It was, however, necessary to enter into the preliminary inquiry, because most of the conditions governing a horse's attitude in a state of rest continue to be equally imperative after action has commenced, and some even more so; for it is more dangerous to the horse to lose his balance when in motion, especially at high degrees of speed, than when standing still.

We may put the questions to be resolved as follows: 1st, How does the distribution of the weight to be

carried affect the horse's speed? and, 2dly, How does action affect equilibrium and balance?

The way in which these questions present themselves points directly to their solution; and, as regards the first, it is to the horse's legs, and the mode in which they are *moved*, that we must look, just as in the former case we looked to the mode in which they are *fixed*. There is, however, a great difference observable between the functions of the hind and fore legs when we come to compare action with rest. In the latter, we were justified in looking on both pairs *equally* as bearers; in the former, the fore legs are still employed *chiefly* as bearers, and only in a smaller degree as propellers, whereas the hind legs act *chiefly* as propellers and in a less degree as bearers. It should follow from this, that we may favour the propelling power of the hind legs by weighting forward within *certain limits;* and this we know to be the case—the long stride of the race-horse *is* favoured by the well-known forward seat of the jockey. Well, what are the limits? In the case of the jockey it is difficult to draw a "hard and fast" line, because his total weight is inconsiderable, and the distances to be got over are inconsiderable; and this is precisely the reason why heavier riders, especially when they have to do long distances, should not ride forward like the jockey, because they are sure, sooner or later, to use up their horses' fore legs by making them exclusively bearers; even race-horses will break down under the light weight, and some jocks are unfortunate in this respect.

And if this be true, it is equally so that placing the weight too near the hind legs must diminish their propelling power, by converting them, in a greater degree,

into bearers: and this may be done in two different ways, one of which, having a very definite object, is good in its way, whilst the other is, to say the least, of very questionable utility under any circumstances. The manege or school rider educates his horse to bear an increased proportion of the weight on its hind legs, these latter being brought forward *under the animal* with bent hocks; but his object not being speed—and it is well known that manege-training diminishes speed, for which reason, precisely, English riders scoff at the *haute ecole*, somewhat unadvisedly perhaps—the manege-rider is perfectly justified in acting as he does in order to attain other objects. It is, moreover, important to remark, that if a horse's hind quarters be not sufficiently strong and pliable to enable them to endure the increased demand for bearing without annihilating their propelling power, such a horse will be incapable of high training in this sense.

The English hussar-horse in Plate VII. is precisely in this position, and having poor hind quarters, incapable of sustaining the weight thrown on them even with perpendicular hocks, much less with his legs bent under him like a school-horse, he is compelled to stretch them out like the props *xi xi* in fig. 1, and is therefore, even in the state of rest, more than half-way to the utmost reach of his stride; for the whole concern must roll over if he attempted, in galloping, to bring up these legs to the hoof-marks of the fore legs. There can be no question, therefore, but that weighting in this manner diminishes speed.*

Before going on to the second question, one word,

* There is a justification for this kind of riding when the fore legs are groggy and the hind ones still good; and this expedient is often

more about the fore legs, which are, as has been said, essentially bearers; they are, however, to a certain extent propellers, and must, at all events should, exercise a springy lever action, lifting the horse's body so as to enable the propellers to shove it forwards. Now, neither the propulsive nor lifting action of the fore legs can be properly exercised unless their several component levers (bones) form certain angles with each other, and enable the hoof to touch the ground lightly, and ready for a renewal of the action. The fore foot should be placed on the ground as one places the palm of his hand on a table; if the leg come down straight and stiff, end on, like the props x^3 x^3 of fig. 1 —which may be as readily caused by a rider sitting too far back on his horse, and being thrown by the action of the hind quarter, with stiffened knees, into a stirrup that is hung far forward in the saddle, as by one that, sitting originally forwards, comes down with a heavy thud directly on the horse's withers—the fore legs must suffer. They are not so constructed as to be thrust against the ground, end on like a pole, with impunity; and if either of these forms of riding be carried to an extreme, it prevents these legs from lifting the forehand in proper time or sufficiently; and the propellers acting meanwhile, down comes the poor brute on his head, and alas for the knees! Sooner or later horses are educated into stumbling in this way, the fore legs being by degrees deprived of their elasticity.

And now as to the question of the mode in which action affects equilibrium or balance. The first point to be observed is, that in walking and trotting the

adopted, especially by that class of riders who sit far back and still manage to ruin their horses' fore legs, of which more anon.

horse moves its diagonal legs simultaneously, or nearly so—that is to say, the off fore and the near hind leg move together and alternate in this action with the near fore and off hind ones; so that, whilst the one pair is being moved forwards the other sustains the weight of the animal; and supposing the horse to be in equilibrio or balance, we might be led to suppose that the perpendicular line passing through the centre of gravity would fall exactly in the centre of a line connecting the fore and hind foot that remains on the ground. But this is not the case, except for the moment at which the movement is half completed.* Fig. 2, *A*, will make this more intelligible. The full

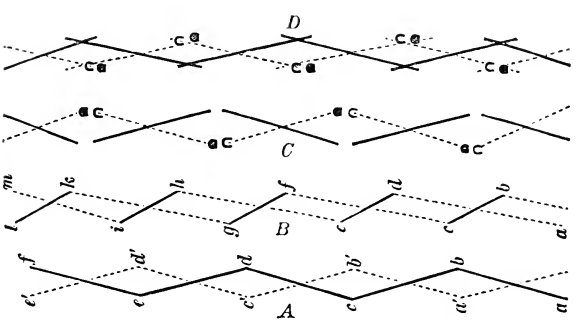


Fig. 2.

lines connect the pairs of feet as they alternately support the horse, whilst the dotted ones represent the

* In the manege movement called *piaffé*, in which the horse moves his limbs as in trotting, but without gaining ground, the perpendicular in question does, in the alternate movement, always bisect the line connecting the two feet which are on the ground.

connection of those in motion. When it comes to the turn of the near hind foot at *a*, and the off fore one at *b*, to move up to their next position at *c d*, the line *a b* becomes a dotted one, a^1 b^1, from the moment this pair of legs leaves the ground, the near fore and off hind legs at *c* and *b* becoming the supporters; and so on alternately. But the dotted lines, in coming up successively to the position of the full ones, intersect the latter at *various* points of their length: the diagram shows them at the moment each successive step is *half* completed, the intersection of the two showing where the perpendicular from the centre of gravity falls. And this intersection—consequently, too, the weight to be supported—is always travelling *towards the fore leg that happens to be on the ground, and therefore the centre of gravity vibrates alternately from right to left, and* vice versa, *in trotting and walking.*

In cantering and galloping the case is different: the two legs at *the same side* are advanced simultaneously, the other two remaining behind. Still, supposing the animal to be in equilibrium, we observe the following to occur (see fig. 2, *B*): the horse "leads" here with the two off feet—that is, canters on the right hand, the two near ones remaining behind *so long as he remains on this hand*; there is, therefore, not the same alternate vibration of the centre of gravity from right to left, and *vice versa*, as in trotting and walking, for it is always the same pair of feet, moreover, just as in trotting the diagonal ones, that mainly support the weight. In the diagram we see that the off hind and near fore legs, connected by the full lines, are both placed close under the centre of gravity in the succession of bounds, as shown at *b, c, d, e, f, g,*

&c., and act *chiefly* as bearers; whilst the near hind leg, *a*, acts *chiefly* as a propeller, and the off fore leg, *d*, as a lifter, these two being connected by dotted lines in the successive bounds, *e h*, *g k*, &c., and the intersections of these full and dotted lines remain invariable.

This will serve to explain why it is that, although a *moderate* trot is less fatiguing to horses than any other pace for a long journey, on account of the pairs of legs being used as bearers and propellers *alternately*, some horses will, under the rider, break into a canter, the alternate shifting of their own and his weight from right to left becoming more fatiguing than the constant use of each pair of legs for the same functions; and the proof is, that many of these horses will go a steady trot in harness when they have only their own weight to adjust. It also explains why horses, when *hurried* in their trot, and over-weighted in the forehand, whereby the bearers (fore legs) become unable to support the weight thrown more and more rapidly on them by the hind legs, which now act solely as propellers, naturally, and to save themselves from falling, "lead" with a fore leg, immediately followed by a hind one—that is to say, break into a canter, which gives them, instead of the alternate *lines* of support, *a b*, *b c*, *c d* (*A*, fig. 2), a permanent triangle, *k l m* (*B*, fig. 2), as a basis.

It may be objected that some horses will trot under the rider that will not do so in harness; no doubt this is because that rider knows how so adjust his weight to the peculiar exigences of the horse; some, from various causes, being assisted in trotting by the rider's weight being adjusted in a particular way, of which a very remarkable instance is adduced in a footnote,

p. 52, of that very admirable work, 'The Handy Horse-Book.' These was some defect of the animal's construction in this case, that required the weight to be adjusted in a peculiar way ; the halter and the riding barebacked tells the tale.

For the sake of simplicity, we have hitherto proceeded on the supposition that each of the two diagonal legs (of every pair) is lifted and set down simultaneously. This is not the case. One hears distinctly four beats in the case of walking and trotting; and two three, or four in cantering and galloping, according as the horse's weight is adjusted in the latter movements. Of the two legs acting in concert, the fore one is lifted and set down somewhat sooner than the hind one; were this not the case, a horse could never tread in his own hoof-marks, much less beyond them, as we shall presently show to be the case. A musician could easily express on paper, by the appropriate notes, the cadence not only of each particular pace, but for each individual horse ;* and good judges are well aware that irregularity of beat points out something amiss in one or more legs. The ear often conveys to us valuable impressions on this very point that totally escape the eye even of the most practised. We all have heard of blind men being good judges of horse-flesh.†

Having now seen the effect of action on equilibrium, where such exists, it is necessary to point out its effects and consequences in cases where it does *not* exist. In

* In the 'Sonnambula,' Bellini has imitated very successfully the beat of several post-horses trotting and galloping just before Rudolfo enters on the scene.

† The theory of equilibrium, as set forth above, is not affected in the slightest degree by this want of perfect coincidence in the movement of the legs.

the diagrams *A*, *B*, fig. 2, the horse is made to tread with the hind foot *into* the track of the fore one (this is, in fact, a consequence of equilibrium); but we see very many horses bring their hind feet (in all paces) more or less ahead of the track or print of the fore ones; indeed almost all young and untrained horses will do so, and, moreover, many whose work requires them to act thus—as, for instance, race-horses. This is best seen by the hoof-marks left on moist ground or sand, which will be found in double pairs instead of single ones after such horses. Now of course it would be as absurd to suppose that, under such circumstances, a horse takes shorter steps with his fore legs than with the hind ones, as to ignore what the immortal Hudibras pointed out long ago—namely, that when, having but one spur, you make one side of your horse to get along, the other is sure to follow; a fact well known to Irish "bull-riders" at Ballinasloe.

There is another class of horses that, instead of overstepping, come short of the track of the fore feet with the hind ones, and almost all horses do this at starting—in fact they cannot do otherwise; these, too, leave a double track.

Now those that overstep will be usually found to be such as are over-weighted on the forehand, whilst those that step short are usually such as are over-weighted behind, without the hind legs being brought under the weight in a bent position like the manege-horse, or that have some weakness, want of due proportion or other deficiency, in their hind quarters.

When a horse oversteps with his hind legs the track of the fore feet (*C*, fig. 2), the succession of full lines connecting the two diagonal feet in each alternate

movement is not, as shown in *A*, continuous, but broken; there is therefore an interval of time during which the weight of the horse (and rider) is not supported diagonally in the usual manner, but vibrates, as it were, from one fixed basis to a more forward one. The animal is off the ground with all four legs for a moment in rapid trotting, for instance—the consequence is, that there must be *less stability*; and we know from experience that, when this is carried to a great extent, the horse "over-reaches," as it is called, and comes down; but, on the other hand, the advantage is gained of getting over the ground more rapidly; for on comparing *C* with *A*, it is evident that more ground has been covered in the former than in the latter with the same number of strides, which are therefore longer. The advantage conferred by throwing the weight forward is, therefore, that it tends to increase the speed; the disadvantages attendant on it are, diminished stability, and the rapid using up of the fore legs, for it is on these alternately that the whole weight pivots, as is were, during the moments of vibration from each fixed basis to the succeeding one, as explained above.

When a horse steps short—that is to say, does not attain to the track of the fore feet with the hinder ones (*D*, fig. 2)—the exact contrary of the above takes place; the full lines connecting the diagonal feet overlap each other constantly—the animal covers part of the same ground twice in its successive strides; these, therefore, are shorter, and it requires a greater number of them to cover a given space. On the other hand, the stability is more perfect, but the hind legs are unduly converted into bearers, and suffer in consequence. That they really are so is shown by the fact of the short stepping

taking place. They cannot act sufficiently as propellers.* What is said here applies equally to canter or gallop as to trot. It has been pointed out above that, in the case of the horse covering its own footsteps exactly, and leaving only a single track, the fore legs are always lifted somewhat sooner than the hind ones, and not exactly simultaneously with them, which produces, as we have seen, the cadence peculiar to each pace, audible to the ear. If the beat be regular, and, the ground remaining the same, the intensity of the sound alike for each footstep, the presumption is that all four legs are equally good; but if one tread be heavy and another light, we may take it for granted that there is something amiss with the foot or leg that makes the latter. With horses, however, that either overstep or tread short (*C* and *D*, fig. 2), the case is different; we hear constantly *two stronger and two weaker beats*, supposing the legs and feet to be sound. The former—stronger ones—will be found to proceed, if we pay attention, from the fore legs in the horse that oversteps,—the two hind ones, chiefly used as propellers, "dinting" into the ground with the toes; with the short stepper, on the contrary, we perceive that they proceed from the hind legs, which are stamped down; and if one leg be defective, we hear, in such cases, three different degrees of intensity of sound, which vary according to the leg and mode of action.†

* Horses that at first naturally overstep will, after a certain amount of work, come to step short; the fore legs having suffered, they ease them by throwing the weight on the hind ones.

† Dishonest dealers are well aware of this, and, to cover it, will sometimes make a horse temporarily lame on one foot to conceal a permanent defect of the corresponding one; the horse will then tread "gingerly" on that pair.

We must now remind the reader that we have, up to this point, taken no account of the influence exercised by the overhanging weight of the horse's head and neck on the animal's equilibrium, having proceeded altogether on the supposition of this being analogous to that of the little instrument represented in fig. 1. It has been shown, however, that the centre of motion,—that is to say, the point round which all other parts of the animal move when in action—or, what comes to the same thing, the point where the least motion is felt,—is situated somewhere in a perpendicular falling through the fourteenth dorsal vertebra, Plate I.; and it has been intimated that the perpendicular through the centre of gravity of a horse naturally falls through some one or other of the vertebræ from the tenth to the thirteenth, that are situate nearer to the neck. A horse can *go* with these two centres in the relative position described here. It favours certain special purposes—as, for instance, racing, and perhaps riding to hounds, to a certain extent—just as it suits the purpose of the manege-rider to bring the centre of gravity further back towards the loins than the fourteenth vertebra; but for *all general purposes* it is of the greatest importance that the two perpendiculars passing respectively through these two centres should be made to coincide,—and this is the aim and object of all school-riding, except for the *haut manége*. Above all, it is indispensable for military purposes.

In fact, in racing, and to a certain extent in hunting, a horse is not required to move otherwise than in nearly straight lines or gentle curves. A jockey that understands the work will ride differently in the latter and the former, and will immediately change his seat

when he comes "into the straight."* On the contrary, the manege-rider requires very short deliberate turns at *low* degrees of speed, and attains his object as above described; but for general riding it is of great importance—for the cavalry, indispensable—to be able to turn in sharp curves at *higher* degrees of speed.

Instead of instituting a mathematical and physical inquiry into the advantages of making the centres of gravity and motion coincide, let us take from everyday life one or two instances that illustrate the principle very satisfactorily. In a common two-wheeled cart the whole body of the machine turns round on the axle, and the centre of motion lies in a perpendicular falling through the mid-point of this. A carter that understands his business always adjusts the load in such a manner that it neither presses too much on the horse's back by lying too far forward, nor on his neck by being too far back in the cart—in fact he makes the centres of motion and gravity to correspond as nearly as possible, knowing from experience that his horse *draws* the cart with greater ease, and *can turn* corners, &c., more readily, when the load is thus adjusted, than in any other manner. For special purposes, as going up hill, he shifts the weight forward, but he is cautious in turning the horse when the load is on the back: there is always danger of falling. Sometimes, when his object is to turn the cart round sharply on its own ground, he shifts the weight to the rear, *the horse* having then perfect liberty to circle round in the required direction; but he never adopts this for a journey, be it ever so short,

* The speed of race-horses is notoriously different on straight and circular courses. The absolutely speedier horse does not always come first to the post on the latter.

Again, in a ship or boat of any kind, people that have experienced sea-sickness soon find out where the centre of motion lies, and nestle round it; and the master who sails her knows well that his cargo or load, whatever it may be, must be so stowed away that the centre of gravity of the whole coincides with the centre of motion of the vessel. This is what is called "trim," as we all know; and the yatchsman knows well the effect of sending a man or two into the bows, when running before the wind, and the use of keeping his hands aft when in stays; but he will be chary of altering the builder's trim, which makes these two centres coincide mathematically; he may never find it again, as has happened in some remarkable instances. Now the horse under a rider must have the trim that suits the objects of the latter; and for general purposes the ship builder's trim or the carter's trim will be found the most advantageous. The bringing the rider's body, from the hips upwards, slightly forwards or backwards, will answer exactly the same purposes as the shifting the hands in a yacht or the sacks in a cart. It can answer no good purpose to alter the regular trim. To persist in sailing a boat out of trim ends in a capsize, or in carrying away spars at least; just as riding out of trim usually terminates in a "purl," and always in the premature destruction of the horse's legs.

And just as too heavy a bowsprit or jib-boom will destroy the trim of a boat, the overhanging position of the horse's head and neck destroys the animal's proper trim *after a rider is placed on its back*; and the question is, therefore, how this may be remedied, seeing that we cannot shift a head and neck like a jib-boom. Fig. 3 shows three levers *d N*, *d O*, *d P*, of equal

length, all moving round the same common centre or prop *d*, which corresponds to the junction of the ver-

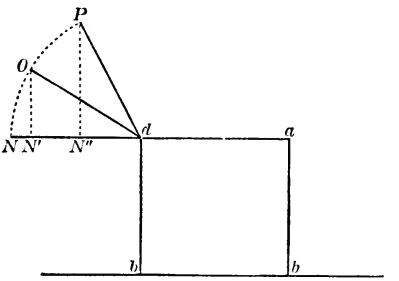


Fig. 3.

tebræ of the neck with those of the back in the horse. Now the longer the lever the greater its power—that is to say, a given weight will act more powerfully at the extremity of a long lever than of a short one, in the exact proportion of their relative lengths. The true expression is, however, that a given weight acting on a lever of this kind exercises a downward (perpendicular) pressure in direct proportion to the distance at which the perpendicular from (or through) it falls from the prop. Therefore, if the head and neck, *d N*, be stretched out horizontally, the relative weight is represented by the whole amount by which the point *N* lies outside the basis *b b* ; and if the head and neck be lifted to the position *d O*, it will be represented by the shorter distance *d N'* ; and if still more elevated to *d P*, then by the still shorter one *d N''*. Consequently, the relative overhanging weight of those portions of the horse's body may be diminished in proportion as their position is brought nearer to that re-

presented by *d P* in the figure; and the further effect of this is, that the centre of gravity of the whole machine resting on the basis *b b*, is thrown farther back on the line *d a*. A horse's neck is not, however, an inflexible straight line like an ordinary lever. Moreover, the head, which forms no inconsiderable portion of the overhanging weight, can be bent at various angles to the neck. We have it therefore in our power not only to diminish the external preponderance of these members by altering their relative position as described above, but also actually to diminish the distance at which the perpendicular falls outside the basis—first, by bending the neck, by which the length of the lever is curtailed; and still further, by making the head assume more and more acute—that is, smaller—angles with the line of the neck, whether this latter be straight or curved.

This is shown by fig. 4, where the natural—that is, unimproved—position of the head and neck makes the perpendicular fall at the distance *D N* outside the basis of the animal; and this corresponds nearly to a line of gravity, *x y*, falling through one of the dorsal vertebræ nearer to the neck than the fourteenth, to which reference has been made. And by elevating the neck somewhat, curving it at the same time, and making the head assume an acuter angle with it, we bring back the centre of gravity perhaps to *E G*, the perpendicular falling through the fourteenth vertebra, or centre of motion—and this is the safest and most generally applicable position: for cavalry purposes it is absolutely indispensable. Finally, if we bring the neck still higher up, curving it still more, as shown in the figure, we can bring the centre of gravity back to the

line *G H*, as the manege-rider does; who, however, at the same time, gets the toes of the horse's hind feet up

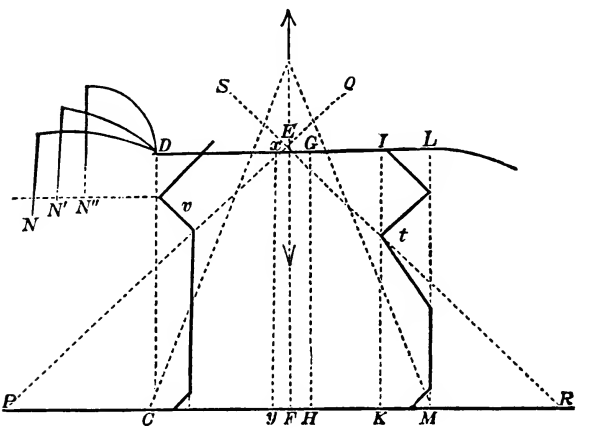


Fig. 4.

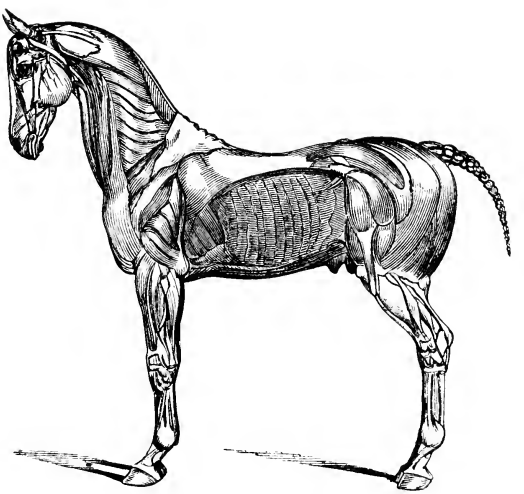
to the line *I K* in a bent position, which naturally brings the croup down* (see fig. 1, x^2 x^2).

The same figure taken together with Plate II. brings us to the final result at which we have aimed all through this chapter—namely, the equilibrium of the horse in motion as compared with the same in a state of rest. Under the latter supposition (rest), we could only show, from the formation of the spinal column (back), that the fourteenth vertebra indicates, by its

* It is necessary to remark that in this case the basis of the figure remains as before at *C* and *M*, the hind legs acting not merely as mechanical props, but maintaining a portion of the weight by muscular action, which, however, must not be too long continued.

peculiar shape and position, a different function from that of the other vertebræ, all of which evidently admit of movement towards it, within certain limits, whilst this one, not being adapted for this purpose, may so far be considered to be intended for the centre of motion. But the construction of the horse's legs, and the relative position of the various bones composing them, furnish us with very clear proof of this same vertebra being the real centre of motion when the horse is in action. For there is one bone in each of the hind and fore legs through which the remainder of the limb acts as a lever on the whole frame, either for the purpose of propelling it (hind legs), or supporting and lifting it (fore legs). These are the thigh-bone *t*, and the arm-bone *v* (fig. 4), whose upper ends have their fulcrums or points of support in the hip-bones *A* and shoulder-blades D (Plate I.) respectively, the power being applied through the medium of the remaining portions of the legs at their lower ends. Now the greatest *result* of lever action is exercised at a right angle to the lever, and drawing the lines *P Q* and *R S* through the lower ends of these two bones *at right angles to them, we find that they intersect* (or cross) *each other precisely at this same fourteenth vetebra.* The figure shows us, indeed, the horse in a state of rest, and not in action; bnt it is necessary to remember that the propelling action of the hind leg *commences, and is precisely more powerful,* when the thigh-bone is in this position, diminishing in intensity as the leg is stretched out towards *R*, and the angles became *flatter*; whereas, on the contrary, the supporting and lifting action of the fore leg *ends,* the arm-bone being as shown in the figure, and is also most intense, diminishing as the fore

PLATE II.



THE MUSCLES OF THE MACHINE.

leg is stretched out towards *P*, and the angles become flatter. It is therefore evident that, *both in a state of rest and of action, the fourteenth vertebra is constantly the centre of motion*; and it is precisely from our practical knowledge of this beautiful mechanism that judges of horses attach so much importance to the length of these two levers, and to their lying at right angles to the hip-bone and shoulder blade respectively —which is recognised by the form of the haunch, and what we call a good shoulder; the length of the stride and its power depending, as is very evident, on those particulars to a great extent.

A farther proof of the same fact may be gathered from Plate II.,* which shows the principal muscles, and the way in which they are arranged. It is those in the back, loins, hips, and shoulders, that concern us here more especially; and we perceive that the principal ones of these all coalesce, as it were, into the large flat tendon covering the identical portion of the back pointed out as the centre of motion. This tendon, like all others, is devoid of contractile power; and the corresponding sets of muscles of the fore and back hand exert *their* contractile powers upon it in opposite directions, whilst it remains stationary, so to say—the whole process having a certain analogy with the familiar instance of a pair of curtains drawn forward by cords to the middle of a window.

According to the laws of mechanics, when two forces of equal intensity cross each other, as the lines *P Q*, *R S*, do in fig. 4, the line in which the combined result of both is further propagated will lie equally distant from and between the two original forces—and this

* Taken from Seidler's Leitfaden, &c.

is, in the instance before us, perpendicularly upwards, as shown by the upper arrow; and the antagonistic force of gravitation—in plain language, the weight of the rider—*will be best met* when it acts in precisely the opposite direction, or perpendicularly downwards in the direction of the lower arrow; and therefore, if the weight of the rider lie, from his mode of sitting, across this perpendicular—for instance, towards the shoulders—the force coming *from* this direction will be met more directly and consumed in proportion; that coming from the other being *spared.*

The two forces of the hind and fore legs may not be, however, and in many horses, in consequence of want of symmetry, are not, equal in intensity. In untrained horses they seldom are. Judicious handling and riding are nothing else, in fact, than finding a proper balance of forces, as well for the untrained well-built horse as for one that is defective in symmetry.

It would carry us too far to go into the detail of the various modes in which the forces exerted by pairs of the hind and fore legs respectively cross each other—as also the centre of gravity itself in walk, trot, canter, &c. The proper methods of shifting the rider's weight from right to left, so as to favour the diagonal action of the pairs of feet, may be easily deduced from the study of these. But it is not our object to write a treatise on equitation; and for intelligent riders, what has been already said will suffice to clear up the doubts that may arise in practice. Indeed the scope of the whole of this chapter has been to set men thinking for themselves, instead of working by rule of thumb, and not to dictate any particular method to them.

CHAPTER II.

THE SADDLE, AND ITS INFLUENCE ON THE SEAT.

If it were merely a question of riding bare-backed, we might at once go on to apply the principles of equilibrium of the horse in motion, as developed in the foregoing chapter, to the various kinds of seats. It would be only reasonable, one should suppose, to accommodate our saddles to our seats, just as we do every other instrument to the purposes for which it is intended; but this is precisely what is very seldom done, and in the great majority of instances the rider sits his horse just in the fashion his saddle allows, or perhaps compels, him to do. Three-fourths of the time and trouble that are devoted in military riding-schools to endeavouring to get the men to sit in a uniform manner might be spared, and the desired result much more certainly attained, by properly adjusting the saddle to the horse *and* man, instead of forcing the latter into a contest with a mechanical difficulty that requires a constant exertion of muscular power; and this latter, being limited in extent and duration, is sure to succumb in the contest, leaving the horse's back to bear the punishment. It is therefore a matter of some importance to understand clearly the mechanical principles applicable to this piece of horse furniture, as it will enable every

rider to ascertain exactly what he wants, and how to attain his object, whatever that may be—as also to save his horse's back, and his own purse, and perhaps, neck.

To begin with the under surface of the saddle—the portion coming in contact with the horse's back—we find two principal points for consideration,—its shape or form, and its size or extent. One general mechanical principle applies to both—namely, that the larger the surface over which a given amount of pressure is equably spread or divided, the less will be the action on any given point of the other surface in contact; and this translated into plain English means, as *regards shape*, that the under surface of the saddle should bear as nearly as possible the same relation to that part of the horse's back it is intended to occupy, as a mould does to the cast that is taken from it, always saving and excepting that strip lying over the horse's backbone, which must remain altogether *out* of contact. The notion of making one portion come into closer contact than another, "giving a gripe," with the intention of preventing the saddle slipping, is altogether erroneous, because it is the *sum total* of the pressure which produces the cohesion between two surfaces; its being concentrated on one point or line does not increase this amount, but is very likely to make a hole in the horse's back. Which part of the horse's back it should be fitted to has been "dimly shadowed forth" in Chapter I., but shall be more clearly and accurately determined in the course of this present one.

As regards size or extent of surface the meaning is, that the greater this is with a *given* weight, the less will be the pressure on any given point, and conse-

quently the less risk of sore back, *provided always that the pressure be equally distributed over the whole surface.* To make a saddle a yard long, and put the weight altogether at one of its extremities, is not the way to attain this very desirable object, as shall be more fully explained presently.*

There must, however, be some limit to the size of a saddle, for its own absolute weight is a matter of serious consideration: it goes into the scale with the jock. *Let the size be proportioned to the weight to be carried,* and if you have a tender-backed horse, make it a little bigger than would be otherwise necessary. Of course a jock can ride his race on a thing that is more a contrivance for hanging up a pair of stirrups than a saddle, whilst a sixteen-stone rider must divide his weight over as large a surface as convenient.

There are two ways in which the weight of the saddle may be decreased without its useful *under* surface being narrowed. The first is to avoid extending the frame (tree), or indeed any other part of the saddle, beyond the surfaces where it really has to support pressure; and this being exercised *chiefly* in a perpendicular direction, it is not only useless but absurd to make these extend *too* far down over the ribs laterally. The second is to use, for the tree, materials combining great strength and moderate elasticity with the least possible weight. A civilian saddle, made altogether of wood, is a very clumsy affair, and it is therefore the

* As familiar illustrations of the principle may be mentioned the difference of depth of track of broad and narrow tired wheels, or of a roller as compared with both: or, a board of one foot square will sink deeper into soft ground under a man's weight than one of double that size; and this latter will sink as deep as the former if weighted *only* at one end.

practice to reduce the volume of the wood, and regain the strength thus sacrificed by iron platings. This metal, is, however, very inelastic : if the plates be made thin and light, they bend, and then retain the wood in a distorted shape ; if thick, they are heavy, and very liable to break with a severe shock, or, if not, to convey this rudely to the horse's shoulder or back, instead of acting as the buffer does between two railway trucks. The platings should be made of steel, not too highly tempered, and it ought to be possible to devise means of strengthening the wood of that part of the tree we allude to without increasing its bulk, and with a diminution of its weight. As to military saddles, they are best made wholly of wood and without any iron whatever. The necessity of attaching a pack makes the question of neat appearance altogether secondary, and the weight that must be carried renders it imperative to economise every ounce that is possible. Moreover, once introduce iron into the composition of a saddle, and you must have a smith and a forge to enable you to repair a broken one, which is often out of the question in the field. The original Hungarian saddle had not a particle of iron on it; no doubt it was subject to breakage, but it could be repaired or a new one made at the side of a ditch, and in time for the next day's march. We nineteenth-century men have improved it everywhere, especially in England, up to more than double its original weight, to a nearly total incapacity for repair or alteration, and to being the most efficient instrument conceivable for making holes in horses' backs.

Supposing, now, the under surface of the saddle to have the proper form and size, the next point to be

determined is, where to put the weight. As we cannot, in consequence of this being a man, divide and spread it out *equably* over the whole upper part of the saddle as we would inert matter of any kind, we must place the rider's *centre* of gravity exactly over the centre of the bearing surface of the saddle, for this is the only single *point* which, being loaded, transmits the pressure equably to the rest of the surface. Take a small common table, and place it exactly level on sand, grass, or soft ground, then put a weight precisely in the centre of the table, and measure the depth to which the feet have been forced into the soil—you will find it to be the same for all four feet, if the surface on which the table stands be equally soft throughout; then shift the table a few inches, having previously removed the weight, and place this near one of the ends instead of in the middle,—measure again and you will find that the pair of legs nearest to the weight have penetrated much deeper than the others; therefore, in order to equalise the pressure, the rider's weight should be placed in the centre of the saddle.

But this is not all. Place a piece of stout board about two feet long on the ground, stand on one end of it, and you will find that the other loses its contact with the ground, and is more or less tilted up into the air—the board has become a lever. Now, make a motion as if about to jump, but without quitting your position on the board; this latter will, being out of contact with the ground at the further end, be shoved onwards in that direction. This is precisely what happens when a rider sits at one end of the saddle, generally the hinder one: this one is pressed down into the horse's back, the other, generally the front end,

is tilted up, and at every movement of the horse and rider the whole saddle is shoved forward till stopped by the withers, which it will probably wound; and then it is either the groom's, or the saddler's, or the horse's fault, and the saddle is thrown aside and some new patent contrivance adopted, which of course does not remedy a defect that depends on the rider himself.

We may now go a step further. Suppose the saddle be placed with its centre exactly over the combined centres of gravity and motion (line *E F*, fig. 4), and the rider in the centre of the saddle, there will be, first, an equable distribution of the combined weight of horse *and* rider on all four legs, both in a state of rest and action; secondly, the movements of the horse, centring in this point, have the least possible tendency to disturb the seat of the rider or the position of the saddle; thirdly, the weight of the rider being equably distributed over the whole surface of the saddle in contact with the horse's back, is therefore less likely to injure any one portion of this; nor does it convert the saddle into a lever, and shove it forwards or backwards. Again, let us suppose the saddle as before, but the rider sitting altogether at its hinder end for instance, and there will be, first, the horse's equilibrium destroyed; secondly, the rider himself, being nearer to the hind legs, will first receive an impulse from the direction *R S*, and be thrown forward till he meets that coming from the direction *P Q*, and these two forces, instead of resolving each other from one common point into their sum total, neutralise each other partially in successive shocks at the expense of the horse's legs. It will be said that the use of the stirrups is to prevent the rider being thus thrown

forward. No doubt they do, and this kind of rider always sticks out his legs toward's the horse's shoulder on the line *Q P*; in other words, *he transmits the shock from the hind legs to the fore ones* through the medium of the stirrups (this, by the way, is the reason why stirrup-leathers are broken), of course shoving the saddle constantly forward, and these men's girths can never be drawn tight enough to prevent the saddle tilting up in front. Thirdly, of course his weight is not distributed equably over the whole under surface of the saddle. This is the man that manufactures sit-fasts, or, at the very least, transforms his horse's back from its natural colour into a strange pattern of white and grey blotches.

Some men would find it inconvenient to sit otherwise than well back in their saddles, and some kinds of riding *seem* to be more easily done in this form than in any other. Now it is evident enough from the foregoing, that if the part of the saddle occupied by the rider be placed over the line *E F*, fig. 4, the horse's balance is not necessarily deranged or the centre of motion interfered with so long as the rider keeps this position; but there always remains the difficulty about the unequal distribution of the weight, and the saddle slipping. Most English gentlemen ride more or less in this fashion, and, from our way of rising in the stirrups whilst trotting, are constantly transferring their weight from one end of the saddle to the other. Of course the horse's balance is thereby subjected to constant changes, and not unfrequently a misunderstanding between horse and rider ensues, terminating in a disaster: but we must not anticipate.

There is another consideration of great importance

with regard to the place of the saddle—namely, that it should interfere the least possible with the action of the muscles of the horse's fore and back hand. Looking at Plate II., we see the back covered with a broad tendon, into which, as has been already pointed out, the muscles of these two parts are inserted, and on which their contractile action is exercised. The saddle should not extend much, if at all, beyond the limits of this flat tendon, because, by doing so, it will be sure to impede more or less the free action of the muscles, whereas the tendon is rather assisted than impeded in its functions by a weight being placed on it; and it is also evident that a rider sitting at one end of his saddle instead of in the centre, will produce the same injurious effect.

The next question to be determined is, To what part of the saddle should the girths be attached? Now it is very evident that, if the placing of the weight in the centre of the saddle has the effect of transmitting an equal amount of pressure to all that part of the horse's back with which the latter is in contact, the attaching the girths so as to act *directly* on the centre of the saddle will have precisely the same effect; and the *friction* that results—that is, the adhesiveness produced by pressure—will be equable throughout, and of course least likely to injure any one particular point. It was a very prevalent idea some years ago, that "the point-strap"—that is to say, the girth that was placed well forward in the saddle—was the thing to depend on to prevent the saddle slipping; but experience has proved this notion to be erroneous; and Sir Francis Head, a very good authority on these matters, has pointed out, if we mistake not, that the proper place for attaching

the girths is in the middle of the saddle. It is, no doubt, quite possible, by placing the girths forward, to accumulate the whole amount of friction on one or two points; but this is precisely what bruises horses' withers without having power to prevent the saddle slipping.

Direct proof of the correctness of what is advanced here may be obtained in the following manner: Take a longish saddle on which the girth-straps (or points) are fixed forward; girth the horse tolerably tightly; now put a rider in the saddle—the heavier he is the more apparent will the result be—and get him to sit *well* back. You will find, by putting your fingers flat between the girth and the horse's chest *before* the man mounts, that, on his taking his seat as above, the girth will be drawn forcibly *upwards*; a proof that the saddle must have relinquished in a corresponding degree its previous "gripe" of the horse's back, or rather shoulder. Now let your man dismount, loosen the girths a little, and put a surcingle right over the *middle* of the saddle; draw this equally tight as the girth had been previously, and put your rider once more into the saddle, making him, however, sit exactly in the middle over the surcingle: your finger, if placed as before, will now tell you, if it should not be apparent to the eye, that the surcingle has become *looser*, the saddle has assumed a more intimate contact with the horse's back throughout, and is sure not to slip or wound.

The Hungarian Puszta rider, or cattle-herd, and most Orientals, never use anything but a surcingle, the great advantage of which is, that, having loosed it to let their horses graze, they can tighten it with one pull, and are in the saddle and well under way whilst one of us is

still fumbling at a multiplicity of straps: and moreover, his saddle remains where he put it; ours seldom does so except by chance. Civilian riders would not approve of the surcingle; the same end may, however, be attained by putting the girth-straps in the middle of the saddle, and *sitting as nearly as possible over them*. For military purposes girths might be altogether dispensed with, and only a surcingle used.

There is an idea prevalent that if the girths are placed as far back as indicated here (over the false ribs), they must interfere with the movement of the horse's chest and lungs much more than if placed well forward over the true ones. This is, however, precisely contrary to fact: the true ribs are firmly supported at *both ends* to make room for the lungs by being drawn forwards: the largest volume of lung lies directly beneath them; the greatest expansion is required *and takes place here*. Under the false ribs lie the thin lobes of the lungs, which increase their volume in a much less degree; they are therefore supported only at one end, and expand but little, serving chiefly as supports for the diaphragm or midriff. But any one who has not yet arrived at the dignity of a "corporation" may easily convince himself of the truth of this by putting on a tight-fitting waistcoat and playing cricket in it: he will soon find the top buttons gone, and much less frequently the lower ones, whilst a waist-belt will prove a convenience. The point from which the stirrup is suspended has nearly an equal influence on the stability of the saddle, and a much greater one on the form of the seat than the position of the girths. If the stirrups be wrong, all the rest being right will be of little avail.*

* Any defects that may exist in the English cavalry seat, and the

What is the legitimate use of the stirrups besides enabling us to mount our horses? The first and most obvious one is to give the rider *lateral* support, to prevent his slipping off to the right or left by his seat revolving round the horse's body as a wheel does round an axle. In riding bare-backed, or on a saddle without stirrups, if the rider falls it is most generally to *one side*, and not directly forwards or backwards: and it is very evident that the more *directly under the rider's seat* the stirrups be suspended, the more efficiently will they perform *this* duty, the resistance offered by them being perpendicularly upwards, or precisely in the opposite direction to that in which the weight falls, which is perpendicularly downwards; whereas, if the stirrups be suspended at a distance from the rider's seat, they act at an angle to the line of fall: they may, and always do, in such a position change the direction of the fall, but they cannot meet and prevent it so efficiently as when placed under the seat. The second use of these contrivances is to enable the rider, for various purposes, to rise in his saddle by standing in his stirrups. And here a distinction must be drawn as to whether it is the rider's object to transmit his own weight indirectly *through* the stirrups to the saddle at the *same point* at which he previously applied it directly with his seat, or at some other point. In the first case it is very obvious that the stirrups are best placed exactly *under* the rider's seat; for, putting aside any changes of the position of his own body from the hips upwards he

very glaring ones that are very obvious in the French seat, and were the immediate causes of all the sore backs in the campaign of 1859, depend on the wrong position of the stirrup in the respective military saddles.

may please to make, everything remains as before, and the equilibrium of the horse is not disturbed. In the second case, on the contrary, supposing the stirrups to be placed far forwards, and the rider far back in the saddle, standing in the stirrups will at once throw the weight from one end of the saddle to the other; make this press partially on the horse's back instead of equably, as in the first case, which see-sawing *must* tend to make the saddle shift, and *must also* alter the equilibrium of the horse, throwing its weight more forward, consequently rendering the animal incapable of turning sharply and handily, and, if done suddenly, frequently even bringing it to a dead halt. In hunting, sharp turns are seldom required, whilst speed is; and therefore there *is* a justification for throwing the weight forwards or backwards, especially in jumping; but even this has certain limits, of which more hereafter. Again, in road-riding, the English fashion of trotting requires a man to rise in his stirrups; but there is really no reason why he should therefore sacrifice the lateral support spoken of above to the extent one often sees, or throw such a surplusage of weight on his horse's forehand. There can be no doubt that he rides *less safely* by so doing, for a sharp wheel-round of a shying horse is more likely to bring him down; but this question of trotting must be also reserved for a future chapter.

For military purposes the stirrups *must* be placed in the centre of the saddle directly under the rider's seat: there is no alternative. The cavalry soldier is often compelled in the use of his weapons to stand in his stirrups. If by doing so the equilibrium of his horse be altered, he disables the animal and himself at the most

critical moment. The power of turning rapidly to administer or avoid a sword-cut or lance-thrust is seriously impaired if the stirrups be placed forward, and the whole concern makes a heavy pitch into the trough of the sea, just at the moment it should "run up into the wind's eye." The late Sir Charles Napier relates in one of his books a lamentable story of a fine gallant English sergeant who lost *both his arms* in this way; and officers who have served in India or Algiers often complain that there is no preventing the native horsemen getting behind their people's backs, where, of course, they have it all their own way, like a bull in a china shop. Sir Charles throws the blame *altogether* on the enormous pack the regulars are compelled to put on their horses' backs. This has, no doubt, its own special influence; but any one who has seen cavalry skirmishing, and understands the mechanism we are labouring to explain, must have also seen that the position of the stirrup acting on the rider's seat has a great deal to do with it.*

We mentioned above that the man riding bare-backed, or on a saddle without stirrups, most frequently tumbles off to the right or left; well, it will be found that *with* stirrups, especially when the latter are *very far forward and very short*, the catastrophe generally supervenes right ahead, the performer being projected, in trajectories not yet described in ballistic works, away over his steed's neck, to the great damage of collar-bones. It is like having one's hand pierced by

* Almost all "rider nations" place their stirrups exactly under their seat. This will be evident from an inspection of some of our Plates, as also that the example has been followed in the best Continental cavalries.

leaning on a reed—the short stirrup that is relied on for safety furnishing an admirable lever-point for the equine catapult.

And this brings us to the length of the stirrup. The length of the arm is generally prescribed as being the proper length for the stirrup. This might answer well enough if stirrups were always suspended at the same perpendicular distance from the upper surface of the saddle, *and* also right under the rider's seat, *and if* men's arms and legs *always* bore a fixed proportion to one another; all of which "ifs" turn out on nearer inspection to be algebraical *x*'s—that is, very variable quantities. To adjust the stirrups *precisely*, the rider had better first mount, and then, letting these instruments loose together, shake himself down into the *lowest* part of the saddle, wherever that may be situated; his assistant may then adjust the stirrups to a convenient length. There is no use in attempting to ignore this *lowest point*, because every motion of the horse tends invariably to throw him into it; and if he does persist in ignoring it, he will find himself a mere stirrup-rider, which is, in its way, quite as bad as a rein-rider, the combination of both being the very climax of bad riding—in fact that monkey-like fashion of clinging to your steed vulgarly termed "sticking a horse." For the absolute length of the stirrup no special rule can be given, applicable to all circumstances and to all kinds of riding; in speaking of the different kinds of seats in a subsequent chapter we shall have to return to this point. The only general rule that can be given is, never make your stirrups *so long* as to render your tread on them *insecure*, nor *so short* as to allow them to cramp up your legs and de-

prive them of the requisite power of motion, making you depend on the stirrups and not on your seat for your position in the saddle. The Orientals all ride in the short stirrups in which they can stand resting on the entire sole of their feet on account of the shovel shape and the size of this contrivance; but their stirrups are hung *directly* under their seat, and in a very different position from that which they occupy in our saddles (see Plate IV.) Short stirrups on an English saddle give quite a different form to the seat in consequence.

With respect to the upper surface, or seat, of the saddle, we have to remark, that as the under one must be large in proportion to the weight, so this should be roomy in proportion to the bulk of the rider; a heavy man will always require a large under surface, but not equally constantly a large upper one, for it is bone that weighs; and as, whatever the seat may be, it should be permanent in some one part of the saddle, there is not only no use, but a positive disadvantage, on account of weight, in having it larger above than is absolutely necessary. It is, however, the form of the upper surface that decides most as to the permanence of the seat. If what we may call the ridge of the saddle be perfectly horizontal, the seat will be determined chiefly by the length and position of the stirrup, because the two surfaces, rider and saddle, are in imperfect contact; and it is therefore usual to dip this ridge at some point and spread it out into a more or less concave surface. Now the form of the seat will depend altogether on the relative position of the *lowest point* of this dip; if it be placed far back the rider will remain there, and if it be placed in the

centre the seat will be also central, and for military purposes enough has been said to show that this is its proper position. Nothing can be more certain than this, that it is the saddler, and not the instructor of equitation, that can most effectually and certainly produce the uniformity of seat which is so desirable; but unfortunately few people ever think of this. The sum of the whole matter is this—*the larger the surfaces of the rider and saddle brought into permanent contact, the firmer will be the seat, and the less will it depend on the stirrups or—the reins.*

The saddle-flaps serve in some cases to increase, in others they absolutely diminish, the surface of contact between the rider and *horse:* their chief use is to protect the man's legs from injury by the girth-buckles, straps, &c. For military saddles nothing can be more preposterous than a stiff flap interposed between the rider's legs and horse's side, because the surcingle and shabrack cover all these things effectually, and perfectly attain *this* object of the flap of the English civilian saddle. This stiff flap is therefore an unnecessary additional weight, and it keeps, moreover, the leg out of its proper position. To sum up the whole of the foregoing, we may describe the general rule for seats to be this,—*the saddle in the centre of the horse's back; the girths, stirrups, and rider in the centre of the saddle;* in short,—*

> "The maxim for the horsy tribe is
> Horatian, 'Medio tutissimus ibis.'"

There are certain appendages to the saddle that re-

* In the original manuscript stood the words, "*in the centre of the saddle,*" which was altered to "*about,*" &c., in the press. The truth is, we were afraid of shocking weak nerves, but so

quire a short notice. And first of all, which is better, the blanket or the feltplate under the light cavalry saddle? The advantages of the former are, that by folding it in different ways you may vary its thickness at different points, and by this means adjust the saddle not only to all the different peculiarities presented by the backs of various horses, but also equally to the changes of form of one and the same back, induced by changes of condition. You can do nothing of the sort with the feltplate; this presupposes all horses' backs alike, which is very wide of the mark; and, moreover, each individual back permanent in its form, whatever change the condition may have undergone—which is equally so. The blanket men say "Yes; and, moreover, you can defend your horse from the cold in winter bivouacs, and keep him serviceable for a much longer time."* "Ay," say the opponents; "but the man covers himself up and leaves his horse to shiver." There is probably some truth in this; and, at all events, the man is kept warm, whereas the felt can never be misappropriated in this way. The advocates of the felt say further, in cases of alarm the horses can be saddled quicker, which is indisputable to a certain extent; for whether the blanket be used as a covering for the horse or man, it takes some time and *two* men to fold it properly if once unfolded. The result is this: if the felt *happens* to fit, the horse will be quickly *and well* saddled—if not, quickly *and badly*;

many good riders have since then expressed their conviction that the girths, stirrups, and rider should be *in* the centre of the saddle, that we gladly return to the old reading.

* The greatest possible luxury in the matter of blankets is, however, powerless to keep horses alive whose rations consist of their neighbours' tails, as in the Crimea.

on the other hand, two or three minutes more *may insure* all the horses being *well* saddled, provided the men know how to fold their blankets, and are made to do so. Two or three minutes may be, however, of great importance : let us endeavour to estimate their precise value. Cavalry on outpost duty never unsaddle, therefore it can suffer no loss of time on account of the blanket; and cavalry in camp or bivouac is, or at least should be, always covered by outposts, and is therefore scarcely liable to surprise, and two or three minutes can make no possible difference where it is a question of preserving the efficiency of the horses for weeks, months, and years. But the superior officers are impatient, their personal credit is involved in the turning out rapidly : ay, that's it. Let the blankets be properly folded at daybreak regularly ; and let the horses be saddled too with loose girths, whether you know if you are to turn out or not, and there is an end of the blanket difficulty, and of many others too.

With regard to the crupper. If your saddle fit properly, and if you sit in the proper way, you don't need a crupper. If neither of these "ifs" be a verity, then the crupper may prevent the saddle running forward, but will also wound the steed's tail, or set it a-kicking, especially if a mare—perhaps, under favourable circumstances, both together ; in either case you must take off the crupper, and what then ? It is better to begin voluntarily with a well-fitting saddle and a good seat, than be kicked into it ; and therefore the cavalry crupper is an absurdity which every one else in the world has thrown away ages ago ; and which the Austrian, Bavarian, and, we believe, many other German cavalries, discarded some fifteen or sixteen years since.

In some of the mounted troops of the British Army an attempt has been made, it would seem, to ascertain whether the crupper can be dispensed with or not, and it is stated that the men decided very generally in favour of retaining it, because they found that without a crupper the saddle was liable to turn over in the act of mounting or dismounting. This is very probable, nay! it is almost certain to take place when the whole pack is built up into a mountain and the hinder knob of the tree, which the rider uses to help him into and out of the saddle, sticks up in such a manner as to supply a most powerful lever for turning the saddle round. The author has a strong suspicion that the felt-plate favours this turning of the saddle much more than a well folded blanket would, especially when the former has become less flexible and at the same time more slippery by use. However that may be, it is certain that if the saddles and packs of mounted troops are found to be liable to turn round when the rider mounts or dismounts, other evils of at least equal magnitude will not be cured by the retention of the crupper as an article of horse furniture.

Sometimes, it happens that this saddle turning is owing to a short man being put on a tall horse. No doubt the average height of a squadron may be made to look more uniform by this ingenious cookery, but the real efficiency is scarcely improved. In countries where general obligation to military service exists, there should never be much difficulty in selecting cavalry recruits of a size suitable to the average height of the remounts obtainable.* In Great Britain this is not so

* There are however even then some difficulties to overcome; for instance the Magyars want, all of them, to be Hussars and

easy, the recruits that offer themselves must be taken whether they are too tall or too short for the horses, and even for the latter there is no well defined average. When the horses and men can be well matched and the pack is properly arranged the crupper will be found quite unnecessary.

The breastplate might perhaps, in most cases, be dispensed with; but in others it is useful in keeping the girths in their place; besides that, it gives a point of attachment for some of the pack, and is indubitably advantageous for lasso draught; it can do no harm, moreover, unless it be too tight, which is generally the result of cavalry commanding officers being as pedantic about the rosette attached to it being at the same height throughout their front, as infantry ones used to be about the mess-tins being mathematically correct on the tops of the knapsacks.

dislike infantry service—whence it often happens that very tall men are found mounted on small horses, and *vice versa* short ones in the infantry.

CHAPTER III.

SEATS.

When one observes the great variety of seats on horseback that present themselves to our notice every day, and their totally contradictory character in the most important respects, a certain amount of bewilderment necessarily ensues, which resolves itself into a curious dilemma. We can scarcely admit that they are all wrong, and it seems equally impossible to assert that they are all right: which, then, is the right, and which the wrong? or is a seat on horseback something outside of the laws that govern the rest of animate and inanimate nature, subject to no rule, defiant of all generalisation, and, in fact, a thing *per se*—a sort of mysterious existence beyond our ken? What, for instance, can be more contradictory than to see one man sitting at one end of the saddle, as in an easy-chair, with his legs tucked up at the other, till his knees are nearly on a level with the pommel; whilst a second, sitting in his fork, sticks out his legs as stiff and as far away from the horse as he can, taking for his model what is very aptly named in 'Harry Lorrequer' "the pair-of-tongs-across-a-stone-wall seat,"—for an illustration of which see Plate V.? And there are no end of intermediate seats between these two, with

the most wonderful curvatures of the rider's back, knowing positions of his head, and artistic contortions of his lower extremities, each and all of which have their partisans and admirers.

We set out with the declaration that we have no desire or intention to set up any one kind of seat as a model; but this is no reason why we should not try to find out and lay before our readers what are the real essentials, leaving them to adopt whatever suits their purpose best. Now the seat on horseback is maintained either by balancing or by friction—that is to say, the greater or less amount of the rider's sitting parts brought into contact with the saddle—or by the support given by the stirrup; and it is easy to perceive that such a combination of *all three* means as leaves *each individual one* its greatest amount of efficiency, will necessarily secure a much greater amount of stability than can be attained by depending on one to the neglect of the other two, or even depending on two in such a manner as to sacrifice the third. The best and safest seat will be always that which depends exclusively on no one means of support, but uses them all in the best manner.

In order to answer the question, Which of the three is the most important? it becomes necessary to review the positive value of each in detail; and first as to balance.

It has been shown, in the preceding chapters, to what an extent the action of the horse depends on the balance or poise of rider and bearer taken together, and how every modification of the latter affects the former, and therefore, that not only some one particular poise must be adopted, but also maintained, for

each kind of riding. Again, it has been shown that the stability of the saddle and the safety of the horse's back depend to a great extent on the stability of the rider's weight—that is to say, on his poise or balance. In addition to these two items comes a third one—namely, the value of poise or balance to the rider himself. Why does anything tumble down from the position it has hitherto occupied? because it loses its balance: and the rider that does so is sure to meet the same fate, unless the friction of his seat, the stirrups, or the *horse's mane* are called to the rescue. Can there be any doubt as to the great value of poise or balance? We think not.

As to friction, this depends, in the case of two *inanimate* bodies coming in contact, *first*, on the *nature* of their respective surfaces, which we must leave altogether out of question here;* and, *secondly*, on the absolute weight with which the upper one presses on the lower one. The amount of surface of contact does *not* increase friction, but, of course, if the whole weight be brought to bear an one or two points of a rider's seat, these will soon require soap-plaster. Here, however, we have to do with an inanimate body, the saddle, on the one hand, and a very lively one, the rider's seat and legs, on the other, whose muscular action may form a very important adjunct to the dead weight in increasing friction; and the amount of this action *does* increase with the surfaces in contact, because a greater number of muscles are brought into action; therefore,

* A very smooth surface to the saddle lessens the friction, for which reason school saddles are usually covered with tan-coloured buckskin, whilst many Orientals adopt sheepskins with wool on, coarse rugs or mats, &c.

we can never bring too great an amount of the surfaces of our seat and legs into contact with the saddle. The friction arising from absolute weight no rider will be inclined to increase by loading himself. Whether that derived from muscular action shall become an important addition to the former, or merely an independent alternative, is, after all, the great point at issue, and that which constitutes the *real difference* between seats. Muscular action will prove an addition to the friction derived from weight if both be exercised simultaneously nearly at the same point, and in the same direction; if not, the rider will have to depend alternately on one or the other, instead of both taken together, which is, of course, much less advantageous.

In some forms of seats the rider depends almost entirely on the pressure of his knees against the fore part of the saddle, and relinquishes altogether the advantages derived from steady contact of his seat with the other end of it. For riding a race or a fox-hunt this may answer; but muscular power is subject to waste, and this method will never do for continuous exertion, being much too fatiguing to the rider, and therefore uncertain.

Nor is this all. "Making," as Sir F. Head says, in describing *the hunting seat*,* "the knee a pivot, or rather hinge, and the legs beneath them the grasp," is like holding a horse-pistol between the tips of the forefinger and thumb, instead of grasping it in the full hand. If the weapon kicks on being discharged, it will revolve on the *hinge* with a vengeance; and if the horse perform a similar feat, the upper two-thirds of the rider's body do the same round the *knee-pivot*.

* 'The Horse and his Rider,' p. 31.

The leg, from the knee downward, is much less fitted for holding or grasping than the thigh is; moreover, it has other functions to perform that interfere with this. The best hunting, steeplechase, and military riders we have ever seen, all agreed on this one point at least—that of depending on the thigh, and not the "under-leg," for their seat; and hence is derived the grand cardinal rule for a good seat: "From the hips upwards *movable*, in order to enable the rider to vary his balance, or use his weapons; from the knee downward *movable*, for the use of the spur, and the control of the horse's hind legs; and between these two points, hip and knee, *fixed*, for the seat." According to this rule, the middle of the rider adheres, both by weight and muscular action, to the middle of the horse; according to the other system, the lower third of the rider clings, by muscular action *alone*, to the horse's shoulders, aided, perhaps, to a certain extent, by the stirrup.

But this brings us to the stirrup. Riding was certainly invented and practised before saddles existed; and it is nearly equally certain that the first saddles, pads, or whatever, they were, had no stirrups, these contrivances having been subsequently invented for the purpose of giving the rider further aid in addition to that derived from balance and friction. Even nowadays many a man can ride bare-backed to hounds or in the *mêlée* without stirrups; and this very short statement of facts ought, we think, to go far to prove that stirrups are very subordinate in value to balance and friction *taken together*, which is precisely why we have used the term stirrup-riding in an opprobrious sense. The "tongs-across-a-wall seat" depends on

balance and the stirrup, renouncing all contact of the legs with the horse's body; the wash-ball seat goes further, and abjures balance. In Chapter II., when speaking of the position of the stirrup in the saddle, we could only give *some* of the reasons why this should be central. We have now arrived at a point that renders it possible to give the remaining ones, which are of no less importance. They are these: The interior surfaces of a tolerably well-built man's thighs and legs, from the fork to the heels, are curved in concave or hollow sweeps, that may be varied from the *knee downwards* by turning the toes more or less outwards;* and if we look at a horse from the rear, it will be very evident that his midship section—that is to say, the lines we should see if the animal were chopped fairly in two right through his fourteenth vertebra—coincides very accurately with the sweep of the rider's legs. At top, no doubt, the figure is flatter than the man's fork, but the ridge of the saddle fills up the empty space to a certain extent: besides which, no *good* rider sits *in his fork*, but on his seat. Further, although the horse's body is rounded away under the belly, the possibility of varying the curve of the leg from the *knee* downwards enables the rider to preserve contact very low down: he can encircle his horse nearly two-thirds when sitting on this line.

If, on the contrary, the stirrup be placed too far forward the thigh runs diagonally forwards toward the horse's shoulder. Now let us look at the horse from the front, standing exactly opposite to his forehead.

* It is therefore very absurd to insist on any specific measure for this. Even a round-thighed man may get up a hollow curve by turning out his toes a little in excess.

We see at once that the animal's body, besides being narrower at the shoulders than at the midship section, presents, first of all, a concave curve from this to the shoulder, and then a convex one over the shoulder, The former of these has no adaptation whatever to the curve of the rider's thighs, and this he cannot change; to remedy which, the fashion of padding the saddle-flaps was introduced. Sir F. Head says it is going out again. The effect of this padding or increased thickness between the rider's leg and the horse's body is, however, to bring the former, *from the knee downwards*, right away from the latter, as any one can see who looks at this kind of rider from the front; and it is therefore evident that the greatest amount of adhesive surface is obtained by placing the stirrup nearly under the rider, and making the tread on it perpendicular, instead of in an acute angle with the horizon.

There is another point to be considered. Is there anything gained by the rider's leg from the knee downwards being in close contact with the horse's body at the midship section, or lost by its being just behind the shoulder, whether in or out of contact? The gain is simply this, that in the first case we can exercise immediately an absolute control over the horse's hind legs, and make him place them as we please—and these being the propellers, we have entire mastery; whereas the loss occasioned by the stirrup being far forward consists in our generally coming much too late with our leg, when we have occasion to use it in this way, the horse having swerved right round before we can get at him and compel him to go ahead; in our having to pull right against the stirrup-leather; and, worst of all, in our being compelled to

loosen our whole seat, in consequence of our thigh-bones refusing to bend. The effect of these two positions of the stirrups and forms of seat on the stability of the latter, when it becomes necessary to stand or rise in the former, we must reserve for a little.

There is a notion prevalent that a military seat is a fork-seat; this is simply a popular error that requires refutation. On the other hand, some people will persist in sitting on that part of their back which is still, perhaps, called back, instead of on that portion of it which is honoured with a supplemental designation. What is a man to sit on? Well, he has two bones in his seat, which we venture, in imitation of German phraseology, to call his "sitting-bones," and a third in rear—that on which umquhile Lord Monboddo built his celebrated theory, since improved on by Darwin, of the human race having been originally developed from monkeys; this third bone completes, with the other two, a triangular basis for the human seat on horseback, and, be it said, a much more efficient one than for the theory in question.* If the angle of the hip-bone comes to be perpendicular over the sitting-bone at the same side, the rider's weight will rest on this triangular basis, which, being the largest available for the purpose, affords the greatest degree of stability to the seat. If, however, the perpendicular from the hip-bone falls *to the rear* of the sitting-bone, the leg and thigh are immediately thrown forward to the horse's shoulder, the rider's back is converted into the segment of a circle, and his weight sways about un-

* It has escaped the observations of the Darwinians that monkeys on horseback never sit on their tails, which, of course upsets their whole theory.

steadily on the Monboddo corner of the triangle. Finally, if the aforesaid perpendicular fall *in front* of the sitting-bone, the fork seat is achieved, the thighs come back towards the horse's tail, the rider's body is carried forward by every movement of the animal, because it rests only on two points instead of three, —and this may be styled the "muff school of equestrianism."

Whatever difference of opinion may exist as to where the rider should sit in his saddle, or however necessary it may be to vary the exact position of the seat according to the object in view, there can be no doubt whatever that the only firm and steady seat *is on the triangle*: the Monboddo bone must neither be overweighted nor made too conspicuous.

The seat therefore, as such, depends on balance or poise, on the amount of surface brought into contact with the saddle, both of which in their turn depend on whether the rider's weight rests on three, two, or only one corner of a triangle, and all this is necessarily modified by the position of the stirrup. We have endeavoured to show the relative value of each element in succession, and now leave the reader to make such a combination of them as best suits his purpose, reminding him merely that, although he may safely modify first principles, he never can totally despise them without committing an absurdity.

A question presents itself here which, although appertaining more properly to the department of practical instruction, is so intimately connected with the matters we have just now been discussing, that it is impossible to pass it over without a few words—it is this: Should we give our first instruction in riding with or without

stirrups? The advocates of beginning without stirrups say, you must first give the pupil a seat, and then when he has acquired balance and a hold of his horse, you can give him the *additional* assistance of the stirrups. Now the most difficult thing to attain is balance, and the stirrup was devised for the purpose of assisting in acquiring and maintaining it; and it is therefore just as reasonable to act in this manner as it would be to set a boy to learn swimming without corks or bladders, and when he learned to support himself in the water give him these artificial aids—and this is seldom thought rational. But there is another objection—namely, that the pupil first acquires one seat, and afterwards is expected to change it for *another and a better one.* Why not begin at first with this? Every practical cavalry officer knows that it is much easier to teach a man that has never been on horseback than one who has acquired methods of his own, which give the instructor the double work of unteaching and teaching. Of course if the people ride at home nearly in the same way and in the same kind of saddle that they are required to do in the ranks—as, for instance, the Hungarians, Cossacks, and others—this does not apply; but with all western nations of Europe it does. It is highly probably that the English system of hanging the stirrups far forward in the saddle has been adopted, partially at least, for the purpose of adapting these instruments to a seat acquired *without* them—that is to say, to a purpose they were not intended for. Long experience in training recruits has resulted in the conviction that it is much better, and in the end more expeditious, to give the young rider stirrups from the beginning; and when he has acquired a certain amount

of confidence and balance you may take away the stirrups to *perfect* the latter, without running the least risk of destroying the former.

To return from this digression, and at the same time bring our investigation of the general conditions on which a *safe* seat depends to a conclusion, let us recall to mind the final result of Chapter II. as it affects the seat. Whatever the form of this may be in a state of rest, from the moment action ensues the lever power transmitted through the hind and fore legs respectively will constantly tend to disturb the rider's seat *more or less* everywhere, but *least of all* when this is exactly over the perpendicular line passing through the centre of motion (the line *E F*, fig. 4); whereas it will be most felt by the rider the more his seat is placed away from this line, *especially* in rear of it.

Here are two scraps of newspaper correspondence: "He never seemed to move in his saddle from the starting-post till he had won the race:" and again—"They still ride as if they formed part and parcel of their horses; it is the old Centaur-like form."

English gentlemen like to ride with ease, and will have probably no objection to grace. The former precludes the idea of all *visible* muscular exertion, and presupposes a feeling of security; the latter is equally incompatible with slovenliness, affectation, or stiffness; moreover, steadiness of the hand depends on solidity of the seat, and this, as we have seen, depends to a great extent on the not being exposed to *conflicting* movements derived from the horse.

The Jockey's Saddle and Seat.—English jockey-riding is universally acknowledged to be perfection; it

is, in fact, a specialty in which the English character is strongly reflected; for although its mere mechanism may be easily imitated, the cool judgment, energy, patience, and promptitude that really constitute a good race-rider, are natural gifts. What interests us more especially is, that this style of riding is in perfect accordance with the principles we have been advocating: the saddle is placed just over the fourteenth vertebra, it is of such small dimensions that the rider can only sit on one spot,* and under this, or very nearly so, the girths are attached and the stirrups suspended; nay, still further, a surcingle passing over the exact centre of the saddle is generally employed. The length of the stirrups should, according to the best authorities, be such as just to enable the jock to clear his saddle when he stands in them, *but never so long as to make him depend on the reins in the least for his upright position*; therefore when he does stand in the stirrups, he transfers, through them, his weight to the centre of the saddle, without, of course, disturbing the general equilibrium of his horse. When he wishes to bring the centre of gravity more forward—which favours, as we have shown, the propelling action of the hind legs—he does this by bending his own body forward *from the hips upwards*, and throwing forward his head, his legs remaining straight down close to his horse; and this bend is altogether different from that of the rider who sits far back in his saddle, with his knees drawn up to the horse's shoulder. When he comes to the finish, the jock sits down to "ride" his horse, just as a cavalry soldier *should*, the great difference being that the latter

* *Hibernice*, the racing saddle may be described as having only a middle, and d—l an end at all.

has but *one hand* to ride with. Much of the success of starting depends on the rider throwing his weight forward at the proper moment, and not *overdoing* it, as good riders well know. The bridle is a much greater difficulty with the race-horse than the saddle, but this we must reserve for the second part of our book.

The Hunting Seat.—This is a difficult subject, and one that cannot be treated dogmatically. Hunting is *well* done in a great variety of forms, and then money is, to most hunting men, a matter of secondary importance. The great majority only require their horses "*to go*;" when they are done up they can buy others, and so on. Race-riders mount for other people's pleasure, and large sums of money are at stake: hence the severe discipline and the carefully-considered *system of riding*. The preservation of the horse, too, is a great consideration: the hunting man rides for his own pleasure, and is only answerable to himself for his expenditure of horse-flesh.

The author of the 'Handy Horse-Book,' remarking at p. 99 on the great difference in speed between English and Irish fox-hunting, says "that the sound principles of hunting are repeatedly sacrificed to the unnatural speed to which hounds are now forced." There are no doubt, many good reasons to account for this. Most men care more for "the spin" than for the hunting itself, which affords merely a pretext. Perhaps, too English hunting is less a pursuit of the fox than a desperate endeavour to distance Thackeray's all-pervading snob, which seems, however, not always to succeed; for as "Magenta" says, in the paragraph of this book quoted above, "the hounds are so forced as to overrun the

scent: then, when at fault, the entire ruck of the field have an opportunity of coming up," &c. &c.

But what we have to do with is the seat, and not the hunting itself, which has been alluded to merely because the pace has evidently a good deal to do with the form of the seat. For, in fact, men of fifty years old and thereabout can scarcely fail to remember that the length of our saddles has been increasing constantly with the rapidity of the pace; and although an increase of the bearing surface of the saddle, as has been already shown, is an admirable thing in itself, no great advantage is derived, so far as the horse's back is concerned, unless the rider be placed in the centre of the saddle. But our saddles have been lengthened chiefly for the purpose of enabling us to get *further away* from the stirrup, so as to use this as a point of support, not against falling to the right or left, but to prevent one's being pulled right over the horse's head in fast galloping and jumping; and thus many riders whose object really is to throw their weight somewhat forward, because this favours speed, actually come to sit almost on the loins of their horses, where they seriously impede the action of the propellers, and are then compelled to throw their body forward in the most inconvenient and unsightly manner.* No doubt if this system were not found to answer the purpose more or less it would scarcely be persevered in. When, however, we find some of the best authorities recommending, and many of the best living riders practising, something very

* Sir F. Head says, in 'The Horse and his Rider,' p. 33, "The generality of riders are but too apt to sit on their horses in the bent attitude of the last paroxysm or exertion which helped them into the saddle, called by Sir Bellingham Graham a *wash-ball seat*."

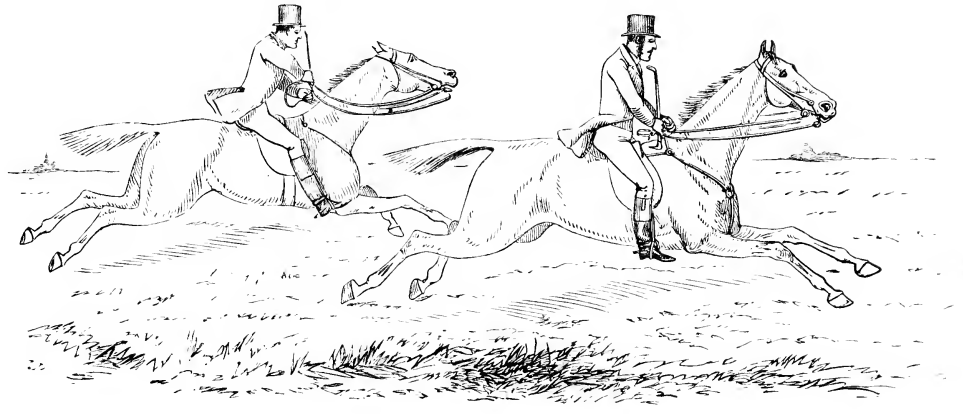
different, one begins not only to doubt its being even relatively good, but also to look with a more critical eye to its positive disadvantages. They are these : It involves unnecessary wear and tear of the horse's fore legs, because the rider's weight is with every bound thrown forward into his stirrups in the direction *Q P*, fig. 4—that is to say, exactly counter to the direction in which the arm-bone *ends* its action; whereas, by sitting over the centre of motion, the shock is equally divided over all four legs, and not on one pair alone. This is what we meant by saying that a man may sit far back and still ruin his horse's fore legs. Secondly, it is not the safest method, because, if the horse fails with one or both fore legs, the rider loses *all* his support at once, the stirrup acting only as a pivot round which, by means of his stiff leg, his whole body is made, by the impulse received from the hind legs, to rotate and perform the catapult experiment. And if a horse suddenly swerves, turns on his haunches, or comes to a dead halt at a jump, the rider is most likely, through the same agency, to continue the original line of movement, whilst the horse adopts a new one, or "reposes." Thirdly, this method of riding tends very forcibly to making the horse convert the rider's hand into a fifth leg for itself, the pull of the head on the rein coming at an acute angle to the push or tread of the leg in the stirrup; and this, when carried to excess, degenerates into *pure rein and stirrup riding without any seat*, especially with horses that carry their heads low. It is, however, just precisely with a hard-pulling horse that a curbed bit would be so desirable, and *with this seat* it is a matter of impossibility to use one. The rule for the jockey we have seen is, never, in standing in

his stirrups, to depend for seat to any extent on his reins. Why this should be neglected in hunting is not easy to understand. The Cossacks and Circassians, who all ride with a snaffle, and do wonderful things with it, sit perfectly independent of the rein: any one can make his horse equally light in the hand with a snaffle as theirs are, by making his seat as independent of the reins *and* stirrups, or use a curbed bit in hunting if he pleases. It is the close steady seat that makes the hand light and the horse's mouth soft; and therefore it is much more valuable in teaching to make the young riders dispense *altogether with the reins than with the stirrups*, and may be done sooner.

Apropos of rising in the stirrups,—"either to avoid a kick, or in jumping a large fence, the rider, by merely rising in his stirrups, at once raises or abstracts from the saddle the point his enemy intends to attack, and accordingly the blow aimed at it fails to reach it."* On the contrary, Mr. Apperley says, "When hounds find and go away, place yourself *well down* in your saddle, on your fork or twist, and don't be standing up in your stirrups (as formerly was the fashion, *and the cause of many a dislocated neck*), sticking out your rump as if it did not belong to you." Who shall decide when such high authorities differ? But perhaps the difference is more specious than real. Mr. Apperley says, "*well down* in your saddle," which, we take it, will bring a man very near to the middle of that piece of furniture, and probably to the horse's centre of motion. *Here* the necessity for *avoiding the blow* does not arise, it is the point of least motion; but if a man sits *well back* in his saddle, *à la* wash-ball, he gets much nearer

* Sir F. Head, as above.

PLATE III.



BAD AND GOOD SEAT.

to the action of the hind legs, and nothing else remains for him than a speedy retreat when this becomes dangerous. Something like this must be the key to this difference of opinion ; for a rifle or other gun that kicks will only hit your shoulder the harder the looser you hold it, and perhaps knock you down if you hold it quite clear, or at least knock the wind out of you. If a man sits in the right place he does not need to rise in his stirrups *for any such purpose* ; and if he does not, the rising in the stirrups, and thereby abandoning his whole seat, may or may not help him.

Perhaps we should never have attempted writing a single line about the hunting seat but for one consideration—it is this : The majority of our cavalry, yeomanry, and mounted volunteers are hunting men, and if there really were such an enormous difference between a *good* cavalry and a *good* hunting seat, as many people seem to suppose, it would be simply a very hopeless case. But is there this great difference ? Mr. Apperley says, "Be assured that the military seat with very long stirrups will not do here, however *graceful* it may appear on a parade." Fortunately this great authority gives us in his own book a drawing intended to represent this graceful seat, which (see Plate V), on closer inspection, turns out to be Harry Lorrequer's "tongs across a wall." Well, no doubt, this won't do for hunting, nor indeed, as far as we can see, for any other good purpose beyond exhibiting the high polish of a man's boots, spurs, and stirrup-irons,—the rider being in uniform scarcely making his seat a *good* military one ; but of this more anon. Mr, Apperley has, however, given us two other figures representing his notions of *good* and *bad* hunting seats, which are here presented to the reader.

On the other hand, there can be no doubt of the total inapplicability of the wash-ball seat to military purposes; and, after all, one comes to the conclusion that the essential difference between any two *good* forms of seat is not so enormous as is commonly represented. If a man "sits on horse ape-like," as the Hungarian phrase is, he will scarcely succeed in any kind of riding; and we believe that the great secret of good horsemanship in general consists in avoiding exaggerations of all kinds. The saddle, the position of the stirrup, and the peculiar object in view, may and must induce modifications of the seat; but riding is still riding, and the mechanism of the horse's construction cannot be altered by mere fashion.

Road-Riding.—The road-rider, although not required to take fences, or permitted to ride at full gallop like the fox-hunter, has his own difficulties to contend with: he has to do his work on a hard inelastic surface, and not on grass fields or ploughed land; he must be prepared to make sharp turns, and to meet all sorts of provocations to shying and restiveness, of which the hunting-man knows little or nothing; in fact, handiness, safety for himself, and a due regard for his horse's legs, are much more important considerations for him than great speed. It is all very well to say that a roadster or hack should possess the qualities requisite to insure the above, but *all* does not depend upon the horse; if the seat of the rider be faulty, a break-down will ensue sooner or later.

Let us take the hard road, in the first instance, into consideration. When one body strikes, falls, or impinges on another, to use a scientific phrase, it receives

the blow back *sooner* or *later*. This is, as we all know, what is called recoil or rebound; the elastic surface gives back the blow *later* and more gradually; the inelastic one sooner and more suddenly. The horse's leg being elastic, it receives but a small shock from the elastic turf, this being divided between both nearly equally; on the hard road nearly the whole recoil is transmitted back to the horse's body through its limbs, and this is nearly equal to the weight of both rider and bearer. There are various means by which this recoil may be diminished in intensity, to the great ease of the horse. One of the most obvious is to distribute the weight as nearly as possible over the middle of the horse's back; which is constructed, as we have shown, in such a manner as to admit of a certain amount of elastic action in a vertical direction—in plain words, up and down. Two men can carry a greater weight with an elastic pole on their shoulders than with a stiff one; and if the burden be not exactly in the centre of it, the man to whom it is nearest will get more of the recoil from the ground than the other one. Now, taking into account that the road-rider does not want great speed, and has at the same time an inelastic surface to deal with, there can, we think, be little doubt that, by placing his saddle and himself over the middle of the horse's back, he will save his bearer and himself a large amount of recoil. If, however, in this position he thrusts his *whole* foot into the stirrup, he thereby throws away a further chance; for, by merely resting with the ball of his foot on the bar of the stirrup his knee being slightly bent, he superadds the elastic action of his own legs at knee and ankle to that of the

horse's, and this is the *legitimate* and useful form of "*bobbing up and down.*"

A wholly useless and absurd method of performing this feat is when the stirrup is ever so far away from the part of the saddle on which the rider sits, for then there is an end of the elastic action of the rider's leg; and unfortunately there are some cavalry services in which this is practised, to the great increase of ruptures amongst the men, and broken knees amongst the horses.

The plan adopted in England is to avoid the recoil by rising in the stirrups, which of course is the most sensible way for a man who has to ride long distances and is not encumbered with weapons. It has, however, its inconveniences, especially if the stirrup is placed very far forward; for then, in the first place, the foot being thrust home in the stirrup, the elasticity of the rider's leg is not utilised; and even when this is not the case, the "tread" being oblique cannot have the effect intended; secondly, the whole seat is abandoned for a certain time, nothing remaining in contact with the horse except the leg from the knee downwards, which is of little use; thirdly, the horse learns to lean on the hand, for the rider must depend on his reins, for a moment of time at least, which of course renders correct bitting impossible;* finally, the rider's weight is being constantly transferred from the hind to the fore quarters of the horse. There may be average equilibrium, but it is never *permanently* in the right place, and hence the danger; for a sudden start or

*Ladies have in general a much lighter hand than men, their seat is firmer and closer, and their horses are usually properly bitted.

stumble at the moment the rider is in the air, is the most common cause of the accidents that occur so frequently.

Now, in truth, there is no reason why this English system of rising in the stirrups (in trotting) should not be practised equally well, not to say better, with the stirrup near the middle of the saddle instead of at one end. The difference is this, that a much less amount of rise will suffice, and the seat is therefore not only less completely abandoned, but also for a shorter time, the horse's balance is not destroyed; and fine bitting may be resorted to.* There is, however, a further peculiarity belonging to this English method that is worth understanding, because the successful trotting of many horses depends on its being so. The "bobber up and down" rises and falls, *with each tread* of the horse; the English rider *only with the intermediate ones*: he always comes down on his saddle simultaneously with one and the same hind leg; and the consequence is, that in trotting after this fashion one diagonal pair of legs is constantly saved from the recoil, and the other as constantly exposed to it in an aggravated form.†

* The author has done many a mile of hard work in this way in a military saddle with stirrups exactly central; and ridden to English foxhounds also tolerably well in full military fig in a stiff country.

† A friendly criticism in the 'Scotsman' objects that we treat the animal too much like a machine, and thinks "that it must be an immense relief to a horse that his rider should occasionally change his position, even to a weaker point," because, by keeping the weight constantly in one place, "the strongest muscles will get tired." Now, in the first place, there is very little muscular action expended or required for the mere purpose of *supporting* the rider's weight—this is done chiefly by the bones and tendons; the great expenditure of muscular action, and consequently the great fatigue,

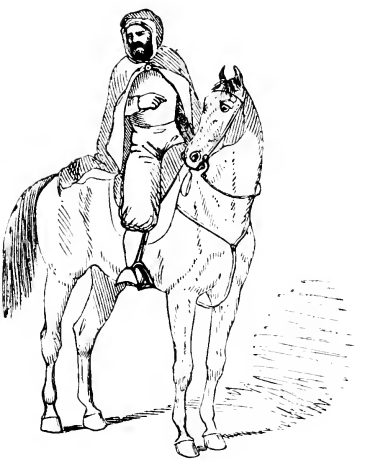
Every practical rider must have observed that with certain horses there is a difficulty, in starting to trot, in the accommodation of the rider's rise in the stirrups to the first movements: he will have to feel his way, as it were, to the proper leg, and perhaps be obliged to sit out two or three shakes before he can get at it; for many horses trot unequally—that is, take a longer stride with one pair of legs than with the other. The rider should observe this in difficult cases, and try to find out, which he soon can, with which hind leg he should rise or fall: men who have this instinct are able to trot horses that perfectly good riders fail with.

Lieutenant-Colonel von Oeynhausen tells us* that the veterinary surgeon Träger, of the famous stud at Trakehnen, has observed that the near hind and off fore legs of most horses are stronger than the other two: and he attributes some well-known but hitherto seemingly inexplicable facts in connection with horses to this circumstance—as, for instance, that they naturally prefer, in cantering and galloping, to lead with the near leg, the weight being then supported by the two strongest limbs (near hind, off fore); that spavin occurs more frequently on the off than the near side; and that horses in wheeling about through restiveness

is occasioned in *propelling* the horse's and rider's weights: and secondly, what we object to so much in the exaggeration of the English system of rising in the stirrups when trotting, and transferring the weight alternately from rear to front, and *vice versa*, is precisely that one set of muscles is constantly overburdened, whilst another set is unduly spared; whereas, by placing the rider permanently in the centre, his weight is alternately propelled by the diagonal action of each pair of legs.

* B. von Oeynhausen, K.K. Oberst-lieutenant, etc.; 'Der Pferdeliebhaber' (Vienna, 1865), at p. 162—a book that cannot be too highly recommended.

PLATE IV.



THE ARAB TYPE.

always do so to the left, on the near hind leg, &c. Mr. Träger advances in support of his views the well-known fact that men's right arms and left legs are naturally most relied on, being also stronger; and he believes this to be the case with very many other animals—dogs, for instance, whose method of going diagonally seems to prove it. Now it is quite possible that this is also the cause of what has been alluded to above—namely, that in trotting after the English fashion the horse endeavours to accommodate the strong and weak pairs of legs to the rise and fall of the rider in the saddle; and if so, it is worth the attention of practical men.

It is, however, quite clear that if we desire to train horses to perfectly equal action on both sides—as is necessary for military purposes, where all must be brought as nearly as possible to one standard of action, or for draught, where the team should trot alike—it will be better to employ the "bobbing up and down system" than English riding. The Americans understand and apply this in the training of their great trotters: few English horses can compete with them, because their trot is uneven. But of course there is no use in attempting a combination of "wash-ball," or "tongs across a wall," with "bobbing;" it will never succeed in anything except shaking the rider's lungs out: the nearly perpendicular tread on the stirrup, with an elastic ankle to break the jolt, is imperative. The Orientals, who use shovel-stirrups, and stand straight on the entire sole of the foot, never attempt trotting—their paces are walk or gallop. Arab horses have, however, a tremendous trot if you can bring them to it; but you must sit like wax, and have the delicate

hand of a first-rate pianist to do the trick; for nothing stronger than a single hair from a fair lady's head is fit for a rein.

There exists in many minds a strong prejudice on the subject of its easing the horse to tuck up the rider's legs, and that nothing tires it so much as a long dangling weight *under its belly*. In the first place, it comes to this, that a giant should not mount a pony; then, again, why dangle the legs? They have a better chance of lying close to the horse's body if the stirrup be placed nearly under the seat, which does not involve their being too long; and further, how if the rider's body be made to dangle in the air *over the horse's back*, in consequence of the attempt to tuck up the legs? This is still more dangerous: one sees every day horses reeling in trot under riders that adopt the very "lofty" English style; the centre of gravity gets a couple of feet farther away from the basis, which is just equivalent to the latter being decreased proportionately. Every one knows that a man with a long back and short legs rides heavier that a long-legged one.

It is scarcely necessary, after what has been already said, to demonstrate over again how conducive to handiness, perfect mastery over the horse, independence of the rein, and therefore good bitting, a central position of the saddle, stirrups, and seat *must* be; and these are, we take it, the conditions under which road-riding may be done *safely* and *agreeably*. High speed *not* being the object, nothing can be gained by throwing the rider's weight forward; on the contrary, it has this further positive disadvantage in addition to those already pointed out. Corns with our horses are as equally prevalent as broken knees, and the latter are very fre-

quently a consequence of the former. Now we have shown (see fig. 2, *C*) that the consequence of throwing the weight forward is to make the horse *overstep* with his hind foot the track of the corresponding fore foot; and this being very much our habit, our horses *do* very frequently overstep, and by so doing the risk is run of tearing off the fore shoes. We have got into the habit of using very short shoes, the web of which does not overlap sufficiently, at the heel, the angle formed by the frog with the wall of the hoof, but falling short, throws the whole pressure *inside* this angle. This is what produces corns. For racing, certainly, and perhaps for hunting, the short shoe may be inevitable, but there is no reason whatever why the roadster should be shod in this fashion, nor even a cavalry horse, except that people *will* persist in either sitting *directly* on the horse's withers, or when they sit on the loins, transferring their weight to the shoulder, through the medium of stirrups hung far forward, every time they rise in the saddle when trotting. Corns and broken knees are totally unknown in the Austrian cavalry, where the shoe is given a solid bearing *on* the angle of the ***wall of the hoof at the heel.***

CHAPTER IV.

THE MILITARY SEAT.

Is there such a thing as a standard military seat or not? and is there any real necessity for it, and what? There can be no doubt that a cavalry in some respects technically inferior may achieve, and often has gained, victories over another, not having any fault of the kind. So very much depends on the way in which this arm is handled, and on its moral qualities, that it is quite impossible to say, "This cavalry, because it rides very well, must, or even will most probably, beat that other one, because it does not ride quite so well." Are we then to conclude that the seat and everything connected with it is a matter of minor importance? The old Austrian cavalry regulations contained a paragraph to this effect: "Cavalry that cannot ride (that is to say, well) is a burden to the state;" but we have been often tempted to paraphrase this and say, "Cavalry that can *only* ride is not less so." Both expressions taken together will then mean, that it is not enough for a cavalry man to be a bold rider; his riding must be done so as to make him an efficient combatant as well: for whatever doubt may exist on account of the almost impossibility of estimating precisely "the other things equal" of the question to be solved, as to whether a

cavalry that rides positively well may or may not prove superior *in combat* to one that rides only comparatively so, this much *is quite certain*, that the former will *bring into and retain in the field a much greater proportion of serviceable horses* than the latter, which is in itself an element of success that may be indeed squandered away like all others, but *must*, if properly taken advantage of, confer great superiority. In fact, what we would say to every cavalry officer of whatever nation is this : Your cavalry is very fine : it has done wonders, and beat *all* other cavalries in the world; but it would do still greater miracles, and beat all *the rest* if you only improved your seat, &c., a little more; besides which it would cost less—a matter of some importance—and perhaps look quite as well as at present.

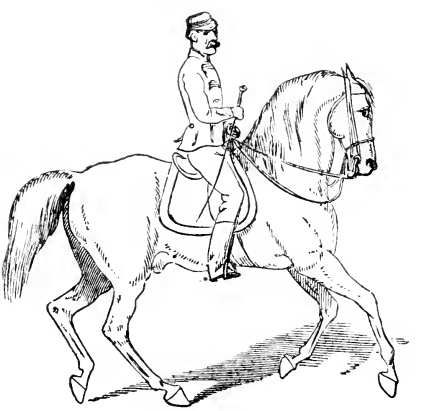
No one, we suppose, will contend that the jockey style of riding can serve as a model for the cavalry soldier : the kind of work to be done and its duration are totally different. Perhaps the hunting seat deserves more consideration. This much is certain ; it is of great advantage to cavalry to be able to get across a difficult country, and much of its utility will depend on its being able to do this cleverly, and in an orderly manner. This has been recognised and acted on of late years to a much greater extent than formerly, and, as we think, very wisely too. Up to a certain time the *haute école* dominated cavalry riding exclusively, and, no doubt, very reasonably, in the then existing semi-cultivated state of Europe, and under the conditions of combat then prevalent. But both of these have undergone great modifications : and first of all, what the Germans call the " campaign school," was introduced for cavalry purposes ; and more recently still,

that very indefinite form called the hunting seat, or rather what is supposed to represent it, has been making considerable inroads into the domains of the riding-master.* All we propose saying for the present is, that the wash-ball seat is evidently not the proper thing for military purposes; whilst, perhaps, "tongs across a wall," may be, in reality, nothing more or less than the progeny of a *liaison* with that respectable old lady the *haute école*—in fact, a mule seat.

Let us pass in review the points of resemblance and of difference between the two kinds of riding. The former are but few in number, the latter very numerous. The hunting man rides his own horse for his own pleasure, and does not mind spoiling a steed or two for the sake of maintaining his character as a forward rider. Cavalry soldiers *must* ride together almost always: what regulates their speed is the average of a whole regiment, and not the swiftness of a single animal. The Oriental national cavalries won't understand this, and get beaten by riders who, taken singly, are very inferior. Again, the hunting man's proper work is all done at full gallop; cavalry does at least five-eighths of its work at a walk (route marching), perhaps two-eighths in trot (manœuvring), and certainly not more than one-eighth at full gallop (in charging). The conclusions to be drawn are, that even supposing the *so-called* "hunting seat" to be the best for high speed, no Government can afford the waste of horse-flesh it involves, nor

* The father of a young cornet recently gazetted told the author that his son had been advised by a brother officer to conceal the fact of his being a "'cross-country" rider on joining his regiment, as otherwise the riding-master would keep him twice as long under his hands.

"TONGS ACROSS A WALL."



THE MODERN MILITARY SEAT.

would there be the slightest use in doing so. On the contrary, this style of riding can only lead to loose and broken charges, *or* to a voluntary abandonment of full gallop in charging. Further, the fox-hunter does not require sharp turning, and he has both his hands at his disposal; whilst the cavalry soldier's life depends to a great extent on his horse being able to turn suddenly and rapidly with the aid of one hand. The *poise or equilibrium of horse and rider taken together can never be too perfect or too permanent in his case.* One of the great mistakes committed is the supposing that what *is called* a balance-seat is the one thing necessary. The whole machine must be in balance, and not the rider alone.

But the greatest difference is in the absolute weight or load to be carried. A hunting man buys a horse *up* to his weight; cavalry can do nothing of the sort, for their horses are compelled to carry any load we please to inflict on them. People rig out a soldier with everything that combined bad taste and absurdity can suggest—put him on a horse that must not cost over a certain price, and call him a hussar, dragoon, or lancer, according to the cut of his coat; and so it comes that what is *called* heavy cavalry sometimes rides lighter, and is altogether lighter, than what people are pleased to consider light cavalry.

There must be some average weight determinable for the average horses and average work of cavalry, but it is very hard to get at anything like a satisfactory solution of this problem, in consequence of the great number of unknown quantities involved in it. Nevertheless, there can be no harm done in attempting, at least, a statement of the question.

French authorities* tell us that a *good* sumpter-horse, working on a *good* road, can carry 100 to 150 kilogrammes (equal to 15 stone ½ lb., or 23 stone 8¾ lb.), at a walk, to a distance of 40 kilometres (equal about 24⅘ English miles) in ten hours. But if the same horse be required to do its work in trot, the burden must be reduced to 80 kilog, (equal 176½ English pounds), in order to enable it to do 22⅕ to 24⅘ English miles in a day (of ten hours). If the burden consists of a rider with his saddle, &c., instead of inert matter alone, the horse can do the 24⅘ miles at a *walk*, on a *good* road, under the greater load of 90 kilog. (198½ English pounds), and he will only require seven to eight hours. It is therefore evident that it is the *dead* weight of the pack which distresses the horse most; and our own experience of jockeys carrying extra weight confirms this.

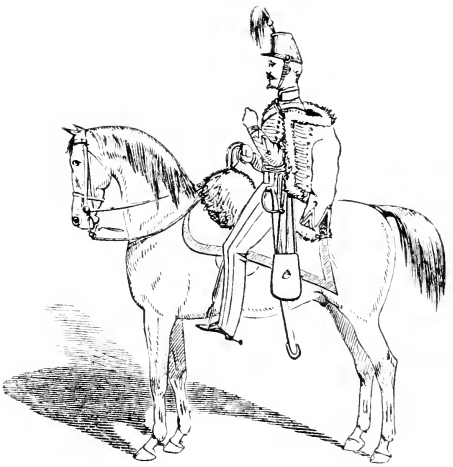
Further, a man carrying a weight without the aid of machinery, can transport 44 kilog. (97 lb. 10 oz. English weight) to a distance of 12⅘ English miles for a day's work; and on comparing this with the day's work of the sumpter-horse, we find that the former is to the latter in the proportion of 1 to 5.

Now it is well understood that a foot-soldier who has to use his weapons cannot carry anything like this 97 lb. 10 oz. English weight, without converting him into a mere "colporteur," the utmost admissible load being 22 kilog. (48 lb. 13 oz.), or *one-third the man's own average weight*;† and as the saddle-horse can

* Migout et Bergery, 'Théorie des Affûts et des Voitures d'Artillerie.'

† The Continental cavalries take 145½ lb., or 10 st. 5½ lb. as the average weight. The British soldiers must be much heavier

PLATE VI.



THE EXTREME CHAIR SEAT.

THE EXTREME FORK SEAT.

carry 90 kilog. $24\frac{8}{10}$ miles *only* at a walk and on a good road, if we take into consideration that some of the cavalry horse's work must be done in trot and gallop, and much of it on more or less difficult ground, it is probable that 90 kilog (198½ English pounds) would be quite sufficient load, although the average marches should not exceed 15 English miles per diem, because the irregular food and the exposure to the weather in bivouacs *more* than compensate for the difference of distance.

It seems, however, to be the practice of most cavalry services to put on their horses at least a third—in many cases even more than that proportion—of the animal's own weight. Strange to say, we must go to the manuals of the artillery and pioneers for the weight of the cavalry soldier. An Austrian authority, Baron Smola, calls the average weight of the horse 743 to 864 English pounds; and it has always been laid down as a rule by the best cavalry officers of that service that 200 Austrian or 246 English pounds, = 17 stone 8 lb., is the maximum load admissable. This would be exactly one-third of the weight of the lighter horse, and about two-sevenths that of the heavier one; so that, in fact, if this rule were adhered to, it would make light cavalry heavier (for the horse) than heavy cavalry. But we suspect that both one and the other have transgressed this limit at various times. Very recently, indeed, the Austrian light cavalry has thrown away sabretaches, echabraques, cruppers, pistol-holsters, and no end of other useless lumber, to the great

than this, probably 11½ to 12 st. The British infantry soldier's kit at present weighs exactly 11.67 kilog., leaving 10.33 kilog., or about 23 lb., for arms and ammunition.

ease of the horse's backs; and the cuirassiers have been all converted into dragoons. Taking 246 lb. as the total weight, and deducting 66 kilog. or 145½ lb. for the average man, there would remain for arms, saddle, kit, &c., 100 lb., which ought to suffice.

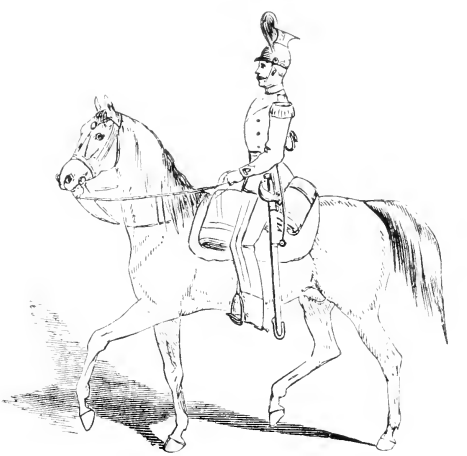
The French 'Aide Memoire' gives us 99¼ English pounds for the weight of the horse, and 1296½ for the trooper complete; consequently the burden is 304¼ lb., or *less* than one-third: and deducting from this, as before, 145½ lb. for the man, there remains 158¾ lb. of *dead* weight. It is no doubt this, and something connected with the seat, which is *very far back*, the stirrups being *very far forward*, that we must look to for an explanation of the sore-back disasters of 1859. It may appear absurd to accuse the French cavalry of riding with a "hunting seat," but in truth theirs *is* an *exaggeration* of a bad one.

A Prussian book* gives 1152 English pounds for the weight of the heavy horse,† and 1546 English pounds for the cuirassier completely armed; consequently the burden is 394 lb. or more than one-third of the animal's weight: and having deducted the 145½ lb. for the average man, there remains 248½ lb. dead weight, or exactly 50 lb. more than Migout and Bergery's estimate of what the total burden should be. The light Prussian horse is set down at 921 English pounds, and the dragoon or hussar complete at 1252 English pounds. Proceeding as before, we find, therefore, that these horses carry 331 lb. = 23 stone 9 lb., also more than one-third their own weight, of which

* Ludwig Schöne, 'Feldbrückenbau.'

† The average weight of the English artillery-horse, is stated, in Griffith's 'Artillerist's Manual,' at 10 cwt. 2 qrs. = 1176 lb.

THE OPEN SEAT AND HIGH PACK.



THE CLOSE SEAT AND FLAT PACK.

185½ lb. is dead weight, or within 13 lb. of what the French authority lays down as the total admissable burden. Now it is remarkable that, notwithstanding this unfavourable state of things, we have hitherto heard nothing about Prussian sore-back disasters in the campaign of 1866, although the cavalry did an immense deal of work; and this can only be attributed to a better seat and method of riding than the French, for the dead weight is absolutely greater.*

If anything is to be made of cavalry in future wars, the burden of the horses *must be* diminished. The most obvious way is by lessening the dead weight; but why should not smaller men be selected? After all, what is really necessary is, that the soldier *should be tall enough to mount with ease and to clean his horse.* Anything beyond that is superfluous.

Let us compare with the above, in order to show how far a "hunting-seat" method is applicable to cavalry purposes, some English standards of weight for flat-racing and steeplechasing, taken at random from the newspapers. For five-year-olds we find 10 st., 12 lb., or 152 lb., for half a mile flat, and 12 st., or 168 lb., for aged horses. For five-year-olds, 10 st. 12 lb. = 152 lb., and for six-year-olds, 11 st. 4 lb. = 158 lb., for two miles' steeplechase. For five-year-olds, 11 st. 7 lb. = 161 lb., and for an aged mare, 12 st. = 168 lb., for a three-mile hunter's stakes steeplechase. These are, we believe, fair samples; but the horses that carry these weights do it once for all: they are the best of their kind perhaps in the world, and are trained and fed in a way quite beyond the reach of cavalry. The immediate object, too, is to take the most out of the

* There were only too many sore backs both in 1866 and 1870 in the Prussian cavalry.

individual horse for the moment; in fact, all the conditions are different.

And as to the seat, the hunting rider can adjust his weight as he pleases; he may vary his position in the saddle, which constitutes the whole of the dead weight, and need not exceed 14 lb.; his doing so must not necessarily give his horse a sore back or bruised withers. On the other hand, the dead weight carried by the troop-horse is most usually equal to, in many cases greater than, that of the rider: a shifting of the seat will therefore necessarily destroy not only the poise of the horse, but, what is still worse, that of the saddle —and this is what kills the horses, or at least sends them into hospital. The cavalry soldier's *seat must* be therefore fixed, and not subject to variation; in charging he must bend his body forwards, from the hips upwards, in order to use his weapons, and stand in his stirrups, and this will suffice to accelerate the speed of his horse. The grand rule is to arrange the saddle itself and the stirrups so that the *rider can only sit in the proper position, that he falls naturally into it, and that it requires no muscular effort to maintain it.* If this be not the case, the moment the man becomes tired, or his horse makes a rapid movement, the whole seat is lost, and the muscular effort that should remain altogether available for the sabre or lance, is expended in endeavouring to maintain or regain an injudicious seat. The true seat is therefore in the middle of the saddle, whose upper surface should be so formed as not to admit of any other one; then the stirrup must be under the seat, and not 8 to 12 inches in front of it. The English hussar, Plate VII., is evidently expending muscular action *to keep his stirrup in a certain position at an angle to its natural fall, instead of the stirrup*

supporting his leg as the latter falls. Such a position is not maintainable for any length of time, or in sharp movement. In trot, for instance, the soldier, not being permitted to rise in his saddle, must seek a support which the stirrups cannot afford otherwise than by assuming an angle at the *other* side of the perpendicular —that is to say, the tread in the stirrup comes to be in the direction of the *point* of the horse's shoulder, "tongs across a wall," and the counter-action is then upwards in the line of the man's thigh, against which the intestines descend, and produce, if there is the slightest natural weakness in the individual, rupture. The stirrups being far forward in the hunting or civilian saddle are not so injurious in this way, because the rider evades the shock by rising in the saddle—and this is just what led to the English way of riding; but the cavalry soldier cannot do so.

It is all very well to say the man *must* retain the position prescribed for him; if he is constantly on the strain to do so, he *simply cannot*; besides which, the stirrup is actually of very little, if any, use to him. Two-thirds of the time and the whole of the talk expended in endeavouring to make a man retain an inconvenient seat can be saved, and devoted to the much more necessary objects of teaching him *how to manage his horse and use his weapons*, if you make the prescribed seat inevitable, and every deviation from it uncomfortable; and this can be easily done.

With the light cavalry (or Hungarian) saddle, it will not do to put a man into it as it comes out of the saddler's hands, and *order* him to sit in a particular manner; it is just as necessary, or more so, to make the saddle fit the man's seat, as to make his coat or boots fit his body or feet; and this is done, after careful

observation of the seat, by shortening or lengthening the bearing-strap of the seat, or by altering the lacings, till the seat comes right of itself, when you don't need to correct it in the riding-school. Fig. 5 shows the outlines of those Hungarian saddles. At *a* the bearing-strap of the seat is laced down so as to have its lowest point towards the rear of the saddle, the consequence of which is to throw the rider's seat back on the Mon-

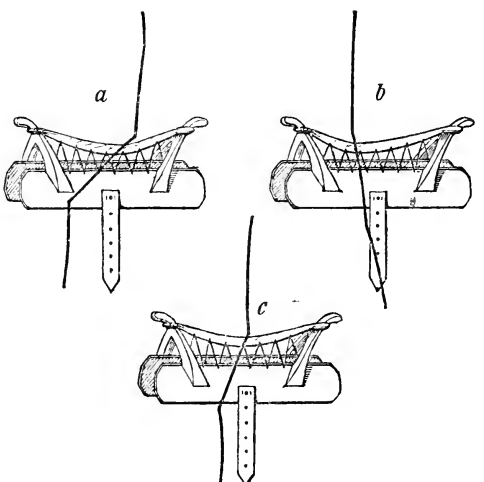


Fig. 5.

boddo bone, bringing the thigh forwards and the knee towards the horse's shoulder, wash-ball fashion. At *b*, the reverse is the case; the bearing-strap being laced down in front, its hinder part throws the rider altogether into his fork, and the thigh and leg come too far back, muff fashion; *a* bends his neck and shoulders

somewhat forward in order to get his balance, whilst *b* strains them backwards. At *c* the lowest part of the bearing-strap is in the middle of the saddle, all of which variation depends on the lacing, supposing the length of the strap itself to be the same : *c* therefore sits on his triangle with his body upright and his legs coming down in their natural fall, his whole weight being spread over the entire under-surface of the saddle-blades ; whilst it is evident that the weight of *a*, being far to the rear, will press down the hinder ends of the saddle-blades into the horse's back, tilting up the front ends ; *b*, on the contrary, drives the saddle-blade ends into the horse's withers : *a*'s saddle will probably run forward, *b*'s horse run through the girths.

The place of the stirrup and its influence on the seat is here altogether left out of consideration. It should be made to accord with the seat, and not the seat with it, otherwise the rider is always "contending against" his stirrups, instead of "depending on them."

How the bearing-strap of the saddle should be exactly laced will depend altogether on the "plenitude" or "poverty" of the seat of honour of each individual rider. A very full-sized sitting part requires the lacing to approach that shown at *a* in order to make the rider sit like *c* ; a very spare man, on the contrary, will require something like *b* for the same purpose : for most young men it will do best as at *c*.*

* The bearing-strap of the seat is best made of a piece of good girthing-web, doubled together so as to form, with its central portion, a collar to embrace neatly the hinder knob of the saddle, the two branches being sewed by their edges together down the middle of the seat, and ending, the one with a strap, the other with a buckle, which, when united, form a corresponding collar for the front knob. Brass eyelet-holes stamped into the outer edges at

The same principle applies exactly to civilian saddles. If you know yourself how you want to sit, you must tell this to the saddler before he has constructed the seat, as that depends on him and not on the saddle-tree maker. It is also evident that, if the stirrups of a given tree happen to be hung too far forward, the defect can only be remedied by bringing the lowest point of the seat of the saddle nearer to them, for the tree itself must remain as the rule of thumb turned it out of the workshop. Civilians fancy that a cavalry seat must be stiff and constrained; to be good *it must* be perfectly easy and unconstrained, and then it will not only answer its purpose, but be really graceful.

One of the great difficulties is about the pack. There is no use in putting the saddle in the middle of the horse's back, and the stirrups and rider in the middle of the saddle, unless you at the same time distribute the weight of the pack equably before and behind the latter; the component parts of the dead weight must be accurately balanced against each other. As regards the form, it should be made *as flat as possible*, instead of being built up into two great mountains in front and rear of the rider's seat, and this for the following reasons: First, the nearer the pack is to the perpendicular lines falling through the centres of motion and gravity the less will it incommode the horse by its vibrations, tend to displace the saddle, or be liable to break the straps and shake loose itself; and the centre

certain intervals would be an improvement. Of course a movable pad covers this bearing-strap, the lacings and the side-plate of the saddle, as far down as the tops of the girth at each side, but it is on the length of the bearing-strap, and the way in which it is laced, that the form of the seat will depend. All the edges of these wooden saddles must be nicely bevelled off.

of gravity is most undoubtedly under the rider's seat; therefore, on this account alone, the lower and flatter the pack the better. Secondly, if the pack be high in rear of the rider, as shown by the English hussar, Plate VII., the difficulty of getting into and out of the saddle is greatly enhanced, and with it the chances of deranging the latter and causing it to turn round; which leads to overtight girthing. The Austrian "hulan," shown on the same Plate, is taken from a coloured penny picture, the only thing we can for the moment procure, and is, consequently, *not* so correct as the hussar, who was photographed from life; still it serves to show what can be done in making the pack flat, and adapting it closely to the horse's body. The white cloak, it will be observed, is folded flat and placed *above* the sheepskin, where it can be got at without opening up the whole pack, and the valise is also flat. Why these articles were ever rolled up into long cylinders, the most intractable and inconvenient form that can be devised, is utterly unaccountable, except on the supposition of cavalry officers having been peculiarly subject to softening of the brain, in consequence, no doubt, of the *solidity* of the shakos and helmets worn in those days. Thirdly, a mountain of pack in front of the rider renders it utterly impossible to adopt a proper system of bitting, or to make the pull on the reins act in the proper direction; even with the greatest care and management, the bridle-hand of the cavalry soldier must be necessarily placed at a greater distance from the horse's withers than that of the civilian: we shall, however, have more to say on this point in the second part of this little work.

The old heavy cavalry leather saddle is gradually

disappearing in almost all services, because it can neither be adapted to each individual horse nor rider. There is only one seat possible with it, the chair-seat, which throws the weight all to one end, and produces sore backs much more frequently than a well-arranged wooden or Hungarian saddle with a proper seat. Several modifications of the Hungarian saddle have been adopted, amongst others, a Danish model; but it is quite absurd to attempt to retain, as has been done in many instances, the chair-seat of the heavy cavalry saddle in a wooden one—better far stick to the old form: however, the difficulty will probably be ended by heavy cavalry being gradually abandoned, for which there are many other reasons than merely the technical ones we have had to deal with.

We cannot wind up this portion of our work better than with a few remarks on the following passage from the 'Handy Horse-Book,' p. 48, 49: "Altogether it might be desirable that commanding officers of some cavalry regiments would study the pose on horseback of Marochetti's sculptured dragoons, or those of other eminent artists. The result would probably be a marked improvement in the position of the saddle, and, consequently, in the general *coup d'œil* of our cavalry," &c. Now, if it were merely for appearance' sake, we should say that no real advantage of other methods should be sacrificed to this; but, after all, what is Marochetti's pose, and why have he and other eminent artists succeeded in producing works that please the eye of such judges of horsemanship as "Magenta" and other sporting men? and why are our public places disfigured by absurd equestrian statues? Simply because Marochetti perfectly understood the equilibrium of the

horse *and* rider, and was bound to do so, as otherwise he could never have got the weight of material to balance on a pair of legs, but must have had recourse, like others, to a post growing out of the ground and into the horse's belly to sustain it, or wholly abstained from the attempt to reproduce his figures in motion. And the ease and dignity of his statuettes depend on the impression they make on the spectator of their perfect security, and because they exhibit the rider as having a perfect control over the movements of his horse; and this is what a cavalry soldier should have. What can be more undignified or repugnant to good taste than to put a great military leader on a horse in the position in which grooms used to ride to water? It disgusts, from being altogether out of character.

But, as we have shown, the safety of the horse's back and the life of the rider—that is to say, the efficiency of the cavalry—depend altogether on perfect equilibrium; and this, we take it, is a much higher consideration than appearance. Fortunately, however, what is really good and to the purpose does please the eye in this as in many other matters. Lastly, far from thinking that a *good* method of riding to hounds is incompatible with, or antagonistic to, a *good* system of military riding, we believe that the former has been of great use to the latter in emancipating it to a certain extent from the pedantry of the *old haute école*, and laying the foundation for the modern system of "campaign riding," which is better adapted to our present cavalry tactics. And, after all, there is not so much difference between a *good* hunting and a *good* military seat as many people suppose; nor should they, on the other

hand, be considered identical, as many others believe, the objects to be attained and the means being different. And this is quite certain, that the "wash-ball seat" is just as useless for the one as "tongs-across-a-wall." is for the other. Exaggeration spoils good riding, as it will the best argument, and is ridiculous into the bargain.

PART II.

BITS AND BITTING.

CHAPTER I.

GENERAL PRINCIPLES.

THERE is scarcely anything of more frequent occurrence than the transition from an incorrect mode of expression to a popular error; we see instances of this daily occurring No doubt the incorrect mode of expression usually arises, in the first instance, either from confusion of ideas or false appreciation of facts, or both taken together; but when once brought into currency, it is frequently accepted not only as a fitting designation, but actually as a true explanation of the nature or mode of operation of the thing designated, and thus grows into what is called a popular error.

It is more especially in matters connected with mechanical contrivances that we observe this to take place and the reason is very obvious. Such modes of expression originate with what are called practical men, who, seldom having leisure or scientific education sufficient to enable them to construct at once correct definitions, commonly judge by the eye or the touch, and translate the evidence of one of these senses into a name. It is in this way that the peculiar languages of handicrafts usually grow up, and the apprenticeship to these consists to a great extent in the acquisition of the proper application of such technical terms; so that,

in fact, this sort of language becomes the means of keeping secret certain processes for the benefit of the initiated, and to the exclusion of the general public.

There can be, perhaps, no very serious objection to this in general, the great desideratum being that the workman should know how to do his work properly, not suffering himself to be misled by the kind of mystical jargon applied to it; but there are cases in which it does an infinity of mischief, and tends to the propagation of serious errors. To give a practical illustration: of the thousands that ride and drive horses in this country, but very few have acquired the art otherwise than by self-teaching—what is called practice; and of the nearly equally great number who are intrusted with the care and management of these animals, precisely the same may be said. What shall we say of the somewhat numerous class of individuals that undertake to "break in" horses, as it is called, except that they distinguish themselves generally by an abundance of courage and determination—very necessary qualifications they are, too—and an equally great lack of anything like rational principle to guide them in the exercise of what they have converted into a handicraft. There is a fourth class, not numerous indeed, but very important in their way: those artisans who spend all their lives in the forge or workshop, have seldom if ever any even the slightest knowledge of horses, and still are intrusted with the fabrication of those instruments, too frequently of torture, which we apply to almost the most sensitive part of the animal's body, his mouth.

Now there is scarcely any one expression so common amongst riders, drivers, grooms, and horse-breakers, as

that a horse's mouth is hard or soft; and when one comes to inquire into the best mode of attaining the last-named quality, which is, of course, that most desired, we find that the exceedingly sensitive gums of the horse are supposed to become soft in consequence of being subjected to a greater or less amount of pressure from a piece of hard iron; an idea in itself perfectly monstrous and contrary to fact, inasmuch as long-continued pressure, if not too violent in degree, has the tendency to produce a gradual thickening of the membrances—in fact, renders the mouth callous, or the contrary of soft; and if so violent in degree as to destroy the textures, and actually involve mechanical softness, the reverse of what is understood by a soft mouth is nearly always produced.

Here, then, most people who have to do with horses start in life with an incorrect mode of expression, which leads directly to a misconception of an important question, and this in its turn to absurd and mischievous methods of practice, and all this from a want of knowledge or a proper application of the simplest mechanical principles. It requires, indeed, only the most superficial inspection of a horse or other animal, either standing or in motion, to perceive that we have to do with a series of much more beautiful and perfect mechanical contrivances than human ingenuity is capable of devising—for the elasticity and power of animal muscle and tendon is altogether beyond our imitation; and this, applied to a most wonderful combination of levers, constitutes the mechanism of animal power. A little further consideration cannot fail to show us that the means we employ to direct the power of a horse, and make it subservient to our wants and wishes, are

altogether mechanical in their nature ; and on entering into an analysis of their mode of action, we find them to consist in the application of the principles of the lever and of equilibrium, matters belonging respectively to the domains of statics and dynamics.

The great difficulty in the rational application of these principles arises partly from the complexity of all problems connected with "equilibrium in motion," and partly on account of the very great diversity in the details of the construction and the relative proportions of these animated machines. If we take the horse's neck, for instance, it may be compared to the tiller of a boat ; it is the lever by which the whole animal is steered, or, in a state of nature, steers itself—the reins being the tiller-ropes. The lever formed by the neck acts on that part of the dorsal vertebræ we have shown to be the centre of motion ; and when the horse is in motion, the lever action of the limbs, derived from the muscles, is propagated to this same point, *the neck and the tail being the regulators* of the movement ; for by means of the neck, the animal, as has been shown in Part I., adjusts its equilibrium according to the degree of velocity it requires, and according to whether it wishes to move on straight or on curved lines ; and a little attention to the movements of young horses, when perfectly uncontrolled, will suffice to show that the position of the neck is constantly varied to suit the exigencies of the moment, the tail following its movements in the most graceful manner as a counterpoise.*

* It would be easy to show that breeds of horses employed constantly for one particular movement have their tails differently seated and developed from those that are employed for a variety of purposes. Our English race-horse is an instance.

It is precisely for this reason that a proper command over the horse's neck is of such value to the rider, enabling him to vary the condition of equilibrium as suits his views for the moment, and to weight one or both of the hind legs, alternately or simultaneously, as may best serve his purpose. It is on a perfect knowledge of this principle that the success of handling young horses, or the overcoming the vices of those that have been injudiciously handled, depends; and there is no more frequent cause of restiveness or indocility than an abuse of the lever action of the neck with young animals.

Some years ago a great sensation was produced by a system of riding, or rather handling horses, introduced by M. Baucher, a French riding-master. According to this gentleman, the power of resisting the will of the rider, and therefore the seat of all restiveness, is located in that part of the neck which forms the articulation with the head; and he found that, by getting the horse's head into a particular position, and fixing it there, he could more or less perfectly master the volition of the animal. But it soon appeared that M. Baucher's system had the radical defect of destroying all the horse's paces; and the Duc de Nemour's condemnation of it, or rather the sentence he passed on it, "Je ne veux pas d'un système qui prend sur *l'impulsion* des chevaux," was most perfectly justified.*

Now the error into which M. Baucher fell was this: The horse's neck is, no doubt, a very powerful agent in our hands; it is, as we have already shown, the lever, and the only one too, by which we obtain a command

* This, too, was the error of the Duke of Newcastle's system which drove us into the opposite extreme.

over the entire motive mechanism of the horse, especially the hind legs; but it is *only by varying its position that this can be usefully effected*—by suiting this to the pace, and the direction of the animal's movements; whilst M. Baucher insisted on *one invariable position of the head and neck.* Moreover, the pull on the reins was *not* in the direction of the centre of motion, and could not act with precision on the hind legs; finally, the position of the horse's head and neck were such as rather to increase than diminish the overhanging weight of these members. Compare fig. 3, Part I., with the French hussar *à la* Baucher in Plate VI., which also shows the immense height and bulk of the pack, and the seat of the rider altogether on the hinder part of the saddle, although, no doubt, in exaggeration. Baucher's "handling" was almost all done when the horse was standing still, and its effect either became null when the animal was put in motion, or, if preserved, the power of locomotion was seriously impeded. No horse ever voluntarily assumed such a position of his head and neck as that prescribed by M. Baucher—in fact, it was wholly unsuited to any form of movement; it was like attempting to steer a ship that had no way on her. He overlooked altogether the problem of equilibrium in motion, and *mistook diminution or restriction of motive power for a perfect command over it, under all circumstances and at every degree of speed.* It is unnecessary to add that the demon of restiveness, whose habitation he fancied he had discovered in the neck-joint, and whom he constantly attempted to exorcise, was simply the creature of his own phantasy.

The various purposes to which horses are applied

demand, of course, different details of handling; but one broad principle applies to them all—namely, to get the whole lever power of the animal to act in conjunction with its weight in the required direction, and this with such a degree of leaning on the bit that the power of controlling all its motions with certainty and ease is secured, without the necessity of interfering in so abrupt a manner with the animal's efforts as to impede them unnecessarily; and to do this in such a manner that the peculiarities of the individual horse and of his work are brought gradually into harmony, is the only effectual means we possess for avoiding all occasion for restiveness, and constitutes rational handling, as distinguished from purely empirical horse-breaking as it is usually practised. For this is the true secret, and not such violent methods as those employed by Mr. Rarey and others. Do not, if possible, give your horse an opportunity of resisting your will successfully, which is usually a consequence of your demanding from him something either beyond his comprehension or capacity; and should restiveness once occur, go back immediately to something the horse will do, and, if necessary, commence the whole process *de novo*.

It will be well to explain here why the perfectly fresh and sensitive mouth of the young horse conveys the sensation of hardness to the hand of the rider, and why the same mouth, after it has really been rendered more or less callous by the application of cold iron to its delicate organisation, comes to be called soft.

When a horse is mounted for the first time, the equilibrium of the whole machine is disturbed, which becomes especially remarkable in the neck. The young

horse bores on his bridle, and tries to acquire a new point to lean on—a fifth leg, in fact: he is hard-mouthed. But when the animal has learned how to carry *itself and the rider*, or acquired an artificial equilibrium suited to the altered circumstances, then it no longer seeks his support, and the mouth is called soft. That such is really the case can be very satisfactorily proved. A horse can be brought into perfect equilibrium under the rider without any bridle whatever merely by using a cavesson instead; and if a snaffle, be then put into its mouth, this will be found to be exceedingly sensitive, and it will require some days' riding before it will "*take the bit*," as the phrase is.

From what has been just stated, it will be easy to understand how the seat of the rider comes to exercise so great an influence on the horse's mouth that the same horse will go light with one and heavy with another rider. First of all, it is a question of equilibrium. One rider assumes a seat that favours, another one that more or less seriously impedes, the efforts of the horse to get into balance—for horses always try to do this. But, secondly, supposing the seat, so far as the distribution of weight is concerned, to be identical, the unsteady rider will seek a support for himself in the reins, and the horse immediately bores against this, and becomes a hard puller; whilst the steady seat makes a light hand and a soft mouth.

It is, in like manner, easy to understand why not only individuals, but whole breeds of horses, should be found naturally light or heavy in the hand, which is owing mainly to the general framework being more or less favourable to equilibrium in motion—mainly, but not wholly, because the interior conformation of the

mouth has always a certain influence, and this is scarcely identical in any two horses, even as merely regards those points that have a direct bearing on the working of the bit; and, moreover, because temper and even sex have also to do with it.*

It is abundantly evident, from the foregoing remarks, that the question of bits and bitting cannot be solved without reference to the whole theory of riding and draught; in fact it forms a very important part of both, which must serve as an apology for the contents of this introductory chapter. Indeed we must go a step further in this direction, and call the reader's attention to another item. What has been said on the subject of the lever action of the neck will suffice to indicate that the direction in which the pull of the reins is made to act on the centre of motion, through the medium of the head, must necessarily determine both the direction and intensity of the lever action transmitted in succession to the other parts of the animal's frame. It is in consequence of this that by merely elevating or depressing the hands, employing a certain amount of pressure with the rider's legs, and throwing his weight backwards or forwards, that it becomes possible to make the horse alter the conditions of his own equilibrium, by bringing his hind legs more under him, or the contrary. In like manner it is possible, supposing the pull to be horizontal—which is,

* It will be necessary to go into further detail on this point in a subsequent chapter. In the meanwhile, we cannot refrain from observing how absurd it is to attempt rigid uniformity in the patterns of bits used by cavalry, or, as is not unfrequently done, continuing through a long series of years the use of a bit originally destined for a very different kind of horse from that found in the ranks at the present day.

by the way, the normal direction for a well-set-up horse for cavalry purposes, as we shall presently see—to concentrate the lever action on *one* of the hind legs in preference to the other, by simply throwing our weight slightly to the same side, which enables us to fix, as it were, certain legs to the ground, or detain them longer in contact with it, setting the others free, and determining with accuracy the mode and the moment of their employment. Many horse-breakers do all this by a sort of instinct. In fact, if they could not do it they would scarcely ever succeed in handling a horse; but there are very few uneducated riders who comprehend precisely the *rationale* of these processes, and are capable of effecting them in all cases with certainty, which is, however, indispensable to success in the handling of young horses, or retrieving the mistakes that have been committed by others with older ones.

We may say, then, that the art of bitting and bridling is a very useful and essential one, because it enables us to avoid the infliction of pain, whilst it secures to us a perfect control over the horse's movements. It consists in enabling us to exercise the mechanical action of the reins in the proper degree and the right direction, for every horse and for every movement.

The influence of good and judicious bitting and bridling on the breaking-in and training of horses is incalculable, whilst ignorance on these points, and abuse of these instruments, are a very frequent cause of restiveness, and of the ruin of young animals, especially of highly-bred ones with their delicate organisations. A bolting race-horse may be set down pretty nearly with certainty as one that has been mismanaged and

abused in this respect. It is scarcely credible the amount of terror with which some horses regard the bit, and the blind fury with which they take it between their teeth, throw up their heads, and bolt in consequence.

Considering the great number of "unthinking" riders and drivers that exist in all parts of the world, it seems perfectly miraculous, when one looks at the frightful instruments of torture placed in the absurdest manner, in their horses' mouths, and used in the most wonderful ways, that so few accidents occur. It is only a proof of the admirable tempers of our horses. The Irish ones are frequently deficient in this respect, being still more grossly abused. Indeed one sees every day, in broken-kneed horses, lamentable evidence of the perversity and ignorance with which horses are treated in this great horse country. There is no use in mincing the matter; this is, to a great extent, a consequence of ignorance of the true principles of bitting, saddling, and—riding; for a broken-kneed horse is an opprobrium to its rider.

As regards cavalry, few things are so important as good and careful bitting. The steadiness of a troop or squadron in its evolutions, and especially in skirmishing, charging, and rallying, depends mainly on it. The writer of this has on more than one occasion converted, in the course of a few days and at a very moderate expense, a body of this kind that had become almost unserviceable from bad bitting into a model of steadiness, the bolters and restive horses all disappearing as if by magic. No doubt, in order to effect this, every single horse's mouth must be measured, and fitted in the manner to be explained hereafter. Three or four

sizes or patterns will not suffice for even 160 or 180 horses, much less for a whole regiment, although our Cavalry Regulations lay it down as a rule that each *regiment* should have "a *few* bits with different and easy mouthpieces and curbs, &c."

Draught-horses are, on the whole, less absurdly bitted than those used for the saddle in this country; and the huge bits one sees sometimes in the mouths of those devoted to purposes of show and pleasure, although ridiculous enough from being so wholly out of proportion, have their reins usually buckled into the cheeks, so as to render the lever action of these wonderful specimens of ironmongery perfectly nugatory, which is so far fortunate. It is, moreover, strange that it should be the fashion to "bear up" carriage-horses to a state of balance which more nearly approaches the equilibrium of the manege than anything else, whereas draught requires the centre of gravity to be carried forward, and the weight thrown somewhat more on the fore legs. And having touched on this point we may as well say a word or two on the subject of the blinds attached to the bridles of harness-horses. All of a sudden a movement seems to have sprung up in favour of abolishing this appendage, which is asserted to be both cruel and useless. Now, in fact, it is neither the one nor the other, but, quite on the contrary, it has a very decided use, and from rendering the management of horses easier, it tends to save them from the infliction of punishment. The horse's hind quarters are the portion of his frame most open to attack, and the animal's instinct renders it consequently extremely jealous of every approach in this direction, which it is prone to resent rashly by lashing

out with its heels, with or without real provocation. It would be, no doubt, a great cruelty to deprive a horse, by means of blinds, of the faculty of providing for his own safety when this care was naturally thrown upon him. But this is not the case with a draught-horse in harness; the driver is there to assume this charge: and the certain consequences of taking blinds off will be to make a great number of horses kickers, and to cause numerous accidents to occur from horses running away to avoid some white apron or handkerchief or the like that appears in their rear. Teams of artillery-horses without blinds become in consequence unapproachable in column by officers who have to gallop up and down with orders; many a leg has been broken in this way, and many artilleries have introduced blinds in consequence, and with immediate effect. Horses without blinds are always for starting off before the driver has a hold of the reins, and soon learn to kick at the least motion of the whip.

But enough has now been said to prove the great importance of well understanding the principles on which bits and bridles should be applied and constructed, both as a means of insuring to the rider and driver perfect command over their horses, and also of saving these most useful and docile animals from ill treatment and unnecessary pain.

From the tenor of the preceding remarks, and indeed of the whole of Part II. it must be evident, that the author's conviction, whether right or wrong matters little, is; that every individual horse requires a bit specially adapted to the dimensions of its mouth and its general construction, and that, although freely admitting, that one bit may be found to suit several in-

dividuals, there can be no such thing as a universally applicable bit or bridle, any more than that certain quack medicines can be, as asserted, equally suited to all men and women indifferently, and to cure all diseases, whatever their nature. Had such been his idea, it would have been very silly of him to take the pains and trouble of writing and publishing this Part II. and he would probably have contented himself with advertising some patent contrivance bearing his own name, according to the usual practice of quacks and nostrum-mongers. This however, was very carefully avoided; the object of the book being in great measure to induce horse owners to think for themselves on this subject. But the business brigandage, which is so rampant amongst us nowadays got hold of the matter, and the author found to his great disgust, and annoyance that a London Saddler had advertised and was selling in great numbers, under the name of "Major Dwyer's Bridles," simply the commonest clumsy pony bits that can be imagined, all of one pattern, and nearly, if not altogether, the same size, consequently anything but universally applicable. The name of a nobleman having been used for the purpose of getting up this smart stroke of business, the public was, as usual, gulled, with which the author has nothing to do; but he has a right to protest against such a use being made of his name, because he certainly never represented that any one shape or dimension of bit is universally applicable, but on the contrary always insisted and still insists, that each individual animal ought to be provided with a bit that suits the dimensions of its mouth, &c.

CHAPTER II.

THE NECK—THE HEAD—THE MOUTH—THE TONGUE—CARRIAGE—FEELING.

We have spoken of the horse's neck as being a lever, which of course, strictly speaking, supposes it to form nearly a straight line, and to possess only a very limited amount of flexibility, neither of which properties, in fact, perfectly belong to it.* But a well-shaped neck, well clothed with firm muscles, possesses both straightness and inflexibility sufficient to render it possible to apply to it the theory of lever action with perfect propriety. Such a neck will only deviate from the straight line to any considerable amount near its point of junction with the head, this latter also acting as a lever, and imparting to the whole that graceful curvature so pleasing to the eye even of the uninitiated—which is, however, not merely a matter of taste, being in fact, an evidence of perfection of equilibrium and power.

It is scarcely necessary to say that there are almost infinite varieties of necks to be found amongst horses as regards these two very important items of straight-

* The horse's neck really forms a double curve, one being turned upward, the other downward; the mechanical action results in a straight line forming the axis of the whole.

ness and inflexibility; it will, however, suffice for our present purpose to point out two extreme cases, the one of form—the ewe-neck; the other of want of stability—the long, straight, thin neck, scantily clothed with flabby muscles. The annexed figure shows how the direction of the pull of the reins is modified in each instance, and how this in its turn changes the

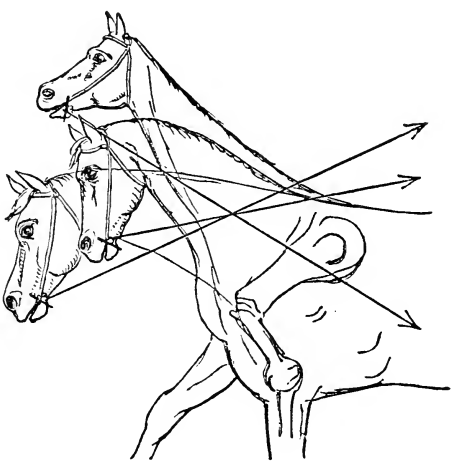


Fig. 6.

direction in which the neck acts on the back. We see that with the exaggerated ewe-neck the lever action goes downwards under the withers immediately on to the fore legs; with the long thin neck that bends throughout like a fishing-rod (as also with all horses broken and bitted on Baucher's principle), it goes upwards through the withers into the air, in both of these cases missing altogether the centre of motion;

whilst the intermediate position, combined with the requisite degree of stability, affords a pull in the desired direction, and coupled with the weight of the rider, meets directly the action of the hind legs, the source of all propelling power.

Nor is this mere theory, for every one that has mounted a great variety of horses, and paid even a moderate degree of attention to their different styles of action, will at once recognise here the true reason of the star-gazer appearing to have his fore legs nailed to the ground by the lightest pull on the rein, whilst the croup and the hind legs are flung wildly about, no pressure of the rider's leg being capable of steadying them and keeping the brute straight, either at rest or in motion. Again, who that ever rode one of those long thin-necked, unstable, rainbow quadrupeds that are so apt to dazzle the eye of the uninitiated, can ever forget the slipperiness of all its movements, and the painful sensation of being mounted on a machine composed of gutta percha and glass? all of which, making due allowance for the irritable tempers of such horses, is a necessary consequence of the pull of the reins being in a wrong direction.

Let us look at cavalry horses. The soldier has one hand for the reins and the other for his weapon: his efficiency depends altogether on his being able to use the latter with precision and rapidity; and this is an impossibility, unless, to use Sir Charles Napier's words, "the steed watches the edge of the weapon"—that is to say, follows the lightest movement of hand and heel instantaneously, as it were intuitively. The Minister of War of a certain German State once represented to his sovereign that it would be necessary to give the

whole of the cavalry sabres of a new pattern, the existing ones being *two inches shorter* than any others in use in foreign services, which would put our troops to great disadvantage : quoth his Excellency, "Then let my cavalry soldiers get two inches nearer to their opponents than has been hitherto the practice," replied Serenissimus. It is just this, it is an affair of inches ; and these inches are widened into yards when the horse does not or cannot follow the reins instantaneously and accurately.

We have already pointed out several disadvantages of the mountain of pack that is built up on the shoulders of some cavalry horses ; an additional one is, that it changes the line of direction in which the pull of the rein acts, so as to make it go right up into the sky, and altogether miss both hind and fore legs, thus placing all horses, whatever the excellencies or defects of their organisation may be, on the same dead level of uncertainty and inaccuracy. It is not the weight alone of "the epitome of a Jew's old-clothes shop" that is so destructive, although this in itself is bad and absurd enough ; what is still worse is the way in which that weight is distributed, so as not only to render all attempts at equilibrium impossible, but also to throw the bridle-hand of the rider so high that he cannot use any description of bit advantageously. A Cossack will load his horse to almost the same pernicious extent that most regular light cavalry men are compelled to do, and still neither the speed, the agility, nor the power of endurance of the little animal are impaired in anything like the same degree as happens with the troop-horse : the weight is better distributed for all purposes.—(Plate VI.)

No doubt it is scarcely possible to avoid some degree of pack on the front part of the military saddle, but it is precisely for this reason that it is so highly important to give the head of the troop-horse a proper position, which can only be maintained by very careful and accurate bitting, after that of the neck has been attained by a judicious system of riding and breaking-in; and still one is astonished to see the pack of the officer built up into the same absurd form as that of the private, although there is no necessity whatever for this being done.

The reader perceives, by these frequent and unavoidable digressions, how intimately the question of bits and bitting is interwoven with the whole system of breaking-in and riding horses, especially for military purposes; and he will see farther on the great importance of this point, particularly when we come to discuss the immediate action of the bit on the interior of the horse's mouth.

We have next to consider the animal's head in connection with this question. Hitherto we have, for the sake of greater convenience, always mentioned the neck as the lever by which the rider controls the motion of the whole animal; but a simple inspection shows that the head is the lever by means of which we gain a command over the neck; and its size, weight, the manner in which it is set on to the latter, and other particulars, have each of them its own share of importance. It is scarcely necessary to say that a very large heavy head renders it a matter of extreme difficulty to get the horse into anything like equilibrium, and big-headed horses will be therefore generally, although not always, heavy in the hand; but it by no means follows

from this that small heads confer of themselves the opposite quality; in truth, more depends on the way in which the head is set on to the neck, the make and proportions of the latter, and the facility thereby afforded for assuming a great variety of positions, than on the absolute size of the head itself.

Generally speaking, all our British breeds have well-formed and well-proportioned limbs. Irish horses, however, have frequently large ones, and what is of still greater importance, peculiarities of conformation which, in consequence of ignorance and injudicious management, sometimes tend directly to produce restiveness, or other equally unpleasant results.

It will be well at this point to call attention to a very simple mechanical principle connected with lever action—namely, that the effect produced depends not only on the absolute power applied, but also on the direction in which this is done. For instance, considering the horse's head as a lever which is to act on the neck and bring it towards the rider's hand, it is very evident that if the former be so stretched out as to form, as it were, a continuation of the latter, as we see race-horses coming into the post, there is, in fact, no lever action whatever. In the same manner, if we can imagine the horse's chin to be brought under, so as to touch his neck, there would be very little, if any, lever action. This is greatest when the head is at a right angle with the neck; and the more it departs from this line,—either forwards, when the animal pokes out its nose—or to the rear, when, in consequence of severe bitting, or other causes to which we shall presently advert, it touches its breast with its chin,—the less will be the useful lever action on the neck.

In fact, we always see runaway horses assume either the one or the other of these two relative positions of the head and neck, the lever action of the head on the neck, and of the latter on the centre of motion, being in both cases reduced to a nullity, which deprives the

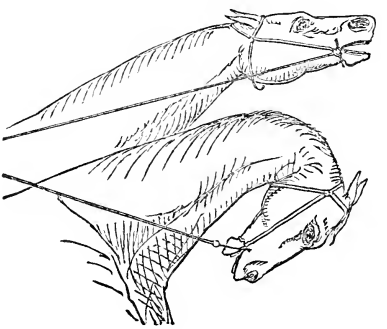


Fig. 7.

rider of all command over his horse; for it cannot be too often repeated that we can only master the horse and obtain a perfect command over his movements by getting the point on which his hind legs, the organs by which he propels himself, act completely under our control, which shows the absurdity of universal bits, and all such contrivances.

With the great majority of horses, the physical conformation of the jaws opposes no obstacle to the head assuming the most desirable position; but there are some, and sometimes very good ones in other respects, where this does occur. Let us take, in the first place, *the depth* of the jaw-bone, measured perpendicularly to the forehead on a line passing through the eye: this

dimension is sometimes so great in proportion, that if coupled with a coarse, fleshy, short neck, the angle of the jaw coming in contact with the latter, a jam ensues before the head can be brought round to the proper angle. But this is perhaps a less frequent, and certainly a less serious, occurrence than another to which we must now advert.

A horse may have a moderate-sized or even a small head, and the depth of jaw alluded to above may be so trifling as not to offer the slightest impediment to the former assuming any position that may be desired, but the jaws may both converge *inwards*, instead of diverging slightly, as they should; consequently the space contained between the two jaws is narrowed in, which prevents the neck fitting into this cavity to the same extent as it will in a perfectly well-shaped head. The angle of flection in such narrow-jawed horses is very limited indeed, and becomes a serious impediment to the breaking-in and bitting of the animal.

There is another case still worse than this, and not unfrequently combined with it—in fact, the narrowness of the jaws very frequently becomes its exciting cause. Most persons conversant with horses must be aware that certain glands lie just under the angles of the two jaws, and run up in the direction of the ear. They are the seat of the affection peculiar to young animals known under the name of strangles. Now it is by no means unfrequent, especially amongst the commoner kind of horses, to find these glands large and flabby in their textures. With well-bred and well-formed animals it is often very difficult to find them at all under the skin. Sometimes the abnormal size of these glands is evidently constitutional, sometimes

it is a consequence of disease—strangles, for instance —and sometimes it arises wholly from the pressure of the angles of the jaws, especially when these lie too close together, and the rider or driver has attempted to force a certain position, either by the use of severe bits, or, what is still worse, a combination of these with the bearing-rein in harness.

If such a state of things be overlooked or neglected, very serious consequenses may arise. The forced pressure of the jaw-bone on these glands is sometimes perfectly excruciating to the animal, and it has recourse, to the great astonishment of its ignorant rider or driver, to all sorts of expedients to get rid of the intolerable pain. It will refuse its work, or run away, or throw itself down, or rear up, or do anything or everything in its desperation, and the brute on its back or on the coach-box knows no other remedy for it than "to flog the sulk out of him," whereas the whole thing is probably the result of bad bitting and bridling.*

Many young horses, too, have been prematurely blinded by undue pressure on the glands in question, between which and the eye there is an intimate connection, both by the absorbent vessels and the nerves. We sometimes find the glands affected on both sides, and just as frequently only on one. The horse will in this case exhibit what may be termed one-sided restiveness, bending and cantering perfectly willingly on the one hand, and refusing more or less obstinately on the other. We can perfectly recollect the case of a

* Why should not corporal punishment be inflicted on those who disgrace themselves and our common humanity by ill-treating animals? It would be the nearest possible approach to retributive justice, and much more effectual than fine or imprisonment.

remount where both horse and rider, excellent tempered, willing creatures, had been tortured for months, until casually passing by we saw from a distance of fifty yards, by the shape of the horse's head, which was very prominent, what the matter really was; on inspection there was found a regular necklace of swollen and highly sensitive glands, especially on the one side.

All these peculiarities of formation *must* be therefore taken into account when we set about bitting or breaking-in horses, and many of those who take this little book into their hands will be able to call to mind instances that came within their own observation tending to confirm most entirely what is here stated, and some will no doubt have cause to regret that they did not study this subject more accurately before they set about horse-breaking.

We now pass on to the other parts of the exterior of the horse's head that have to do with the matter in hand. On referring to Plate I., exhibiting the internal framework and the external contours of the horse, the reader will perceive, on looking to the head, that the osseous or bony parts of this organ are covered very unequally by the soft parts—the muscles, skin, membranes, bulbous roots of the hair and beard, fat, &c.— in fact, what are usually called the integuments; the bone has, moreover, sharp edges on the under surface of the lower jaw, and a certain portion of the nose consists of cartilage, as may be seen from the Plate already referred to. The practical importance of all this depends on the different degrees of sensibility to pressure that result from these varieties of conformation; for instance, the lower lip is covered with a

very thick skin, underneath which lie the roots of the beard, fat, and membrane, and this structure is continued up into a certain depression under the chin, known as the chin-groove, and called by the Germans the curb-groove (*kinnkettengrube*). Now the portion of bone immediately beneath the thick and not very sensitive skin of the chin-groove is flat and rounded off in all directions, being, in fact, that point where the two branches of the jaw begin to unite together; and if a flat curb-chain, for instance, which has a proper width, act in this groove, a considerable amount of pressure may be applied without causing any very unpleasant sensation to the horse.

But if we pass our finger up out of this groove towards the angle of the jaw, we immediately find that both the character of the bone and that of the skin covering it have become very much changed; the former has got sharp hard edges, and the latter, being no longer furnished with beard, will be found to be thin, and very sensitive; so that a very slight pressure of this thin skin on the sharp edges of bone causes very considerable pain. We shall presently see that no horse can be properly bitted unless these peculiarities be borne in mind and due allowance made for them.

As to the cartilage of the nose, it is of importance to recollect what we are pulling at when we put a cavesson on a young horse; the point at which the bone ceases and the cartilage commences is especially sensitive and liable to injury. A cavesson is a most admirable instrument for those who know how to use it; but most frequently it is like putting a sharp razor in the hands of a madman to let an ignorant or half-taught rider catch hold of the lounge. Many a young

horse has been spavined by an angry drag at his nose with this very powerful instrument—a good illustration, by the way, of the lever action of the horse's neck on his hind legs.

The interior of the horse's mouth is the object that next demands our attention, but there is only a certain portion of it with which we have here to do. It is easy to perceive, on looking at a horse's mouth in and outside, that the lower jaw consists of two flat irregularly triangular cheek-bones, whose anterior branches form a groove or channel in which the animal's tongue lies, enclosed towards its root between the two rows of molar or grinder teeth, further forward by those portions of the jaw that lie between the point where the molar teeth cease and the incisors or cutting teeth commence, known generally as *the bars*, and on the lower portion of which the tusks are to be found in male animals; the channel being closed in front by the incisors, and the tongue thus fenced from injury on all sides.

The bit, of whatever kind it may be, coming to be laid *somewhere* on the bars, and across the tongue, these are the most important parts of the mouth to be acquainted with. With the snaffle the portion of the bar exposed to pressure varies according to the pull on the reins; with a regular bit furnished with a curb, this should not be the case; in fact, rational bitting demands that the action of the bit should be confined exclusively to a certain point on each side, and it will be shown further on that the bit cannot act properly on any other point than this one.

We have a rule of thumb in this country for determining the place of the bit—namely, at a certain

height above the tusk; but as mares and even many geldings have no tusks, this is a very clumsy method, which is supplemented in practice by hanging the bit in the horse's mouth nearly as high as the angles of the lips will allow it to go. This is about equally wise as it would be to put the lock of a gun somewhere near the vent—an inch or two higher or lower does not matter. As far as the bit itself is concerned, half an inch, or even a full inch, higher or lower, would not make much difference in its action; but, as we shall presently see, the curb has one fixed position in the chin-groove, and this governs the whole arrangement.

There are three dimensions of the interior of the horse's mouth which must be accurately ascertained before attempting to fit him with a proper bit, in addition to certain details connected with the tongue. The first, and a very important one, is *the transversal width of the mouth* from side to side, measured *at the same height as the chin-groove*, and including the thickness of the lips—that is to say, from the point *d*, fig. 12, to the corresponding point at the off side.* This gives the width of the mouthpiece, which must be made to fit exactly, as, if too narrow, the lips are subject to injury and their being displaced so as to cover the bars, thereby neutralising the action of the whole instrument; whereas, if too wide, it slips from side to side, and displaces what is termed the port—the curved portion of the mouthpiece intended to moderate the pressure on the tongue—from its proper position: it also determines the length of the curb. The second dimension is the *width of the channel* in which the

* The proper mode of ascertaining all these dimensions accurately will be stated further on.

tongue lies, or the distance between the two bars internally, which determines how much of the mouthpiece may be allowed for the port; the remainder must be reserved for the action on the bars.

The third dimension is what we term *the height of the bars*,—that is to say, the distance between a straight edge supposed to rest on the upper surface of the bars at *d*, fig. 12, as above, and another straight edge placed exactly parallel to it, and touching the undermost point of the chin-groove — mathematically speaking, the tangent to the curve formed by the groove. This latter dimension—the height of the bars—is perhaps the most important of all, because all the remaining dimensions of the bit must be deduced from it.

The width of the mouth is, as may be supposed, a very variable quantity, depending on the breed and size of the horse. Nevertheless Lieutenant-Colonel von Oeynhausen,* who has had occasion to measure the mouths of a very great number and variety of horses, says,† that with the great majority of horses of the smaller medium size, 15.1 to 15.3 hands high, their dimension amounts to 4 inches. With very small and very light horses one finds occasionally $3\frac{3}{4}$ inches; the great majority of good-sized saddle-horses, 15.3 to 16.2 hands, have $4\frac{1}{4}$ inches, and some very large ones go to $4\frac{1}{2}$ inches; while 5 inches is only to be found amongst very heavy draught animals: and on reducing these to English measure we have 4.148, 3.889, 4.407, 4.797, and 5-185 English inches.

* Of the Austrian army—perhaps the most learned man living in the matter of horse-flesh, and the author of several admirable works.

† 'Zäumungs Lehre,' p. 19.

Our own experience, which has been considerable, though not to be mentioned in comparison with Von Oeynhausen's, confirms this very accurately; and on referring to old pocket-books devoted to notices of this kind, we find that, out of some 400 horses belonging to certain squadrons of light cavalry, measured some eight or nine years ago, the width of the mouth was for the smaller ones exactly 4 English inches, and for nearly the whole of the remainder 4.2 inches, one or two only reaching 4.3 inches. A great number of bits were put down for alteration as being a half to one inch too wide, and some thirty or forty went to the heap of old iron, as being utterly useless from their immense size. Some officers will perhaps smile at this as a piece of pedantry; but if they had witnessed the results obtained, they would probably adopt the same plan. As it is, let any cavalry captain in the British service take the trouble of ascertaining, which he may easily do, how many bits in his troop are half an inch, a full inch, or perhaps still more, too wide. he will probably then find a clue to many little annoyances he meets with during drill.

The width of the channel in which the tongue lies always bears a certain proportion to the height of the bar, measured as above described; we must therefore take this latter in the first instance.

Lieutenant-Colonel von Oeynhausen says that the height of the bars is $1\frac{3}{4}$ inch* with the very great majority of horses, and that it is very unusual to find it either more or less. The author has certainly never found bars that exceeded 1.8 English inch in height, but he has seen some that were less—perhaps about

* Equal exactly to 1.81 English inch.

two to three per cent of the horses he has had to do with. Now this is a very important dimension, because the upper part of the cheek of the bit should *never exceed* the height of the bar of the horse's mouth—why, shall be made clear in another chapter; notwithstanding which, it is only necessary to go into any saddler's or bit-maker's shop to satisfy one's self that a very large proportion of bits, even of those intended for saddle-horses, are constructed in total defiance of this rule, and calculated for animals that have much higher bars, wherever they are to be found.

But if there is very great uniformity in the absolute height of the bars, there is, on the other hand, a very great diversity in their shape and texture, some being flat-topped and broad—others, again, presenting a ridge-like surface; some also spongy, soft, and comparatively devoid of feeling, whilst others appear firmer, finer, and more sensitive; all this exercising an immense influence on the bitting.

The width of the channel for the tongue, or lingual canal, as the anatomists would say, is pretty nearly always three-fourths of the height of the bars; and this being very constantly 1.8 inch, the other will be found to be about $1\frac{1}{3}$ inch of our English measurement, which gives us the dimension of the maximum *width* of the port of a bit, where there is one; because supposing the mouthpiece to have exactly the proper width, if the port be made wider than the lingual canal, its corners will come on to the bars of the horse's mouth and produce intolerable pain, which, once for all, is wholly inconsistent with good bitting: and this is precisely the reason why it is of so great importance that the width of the bit should coincide so accurately with

that of the horse's mouth; as, if it be too wide, and a port exists, every pull of the rein will be sure to bring its angles into painful contact with the bars on the one side or the other.*

The tongue itself is what we have next to direct our attention to. This organ will be found to vary very much both in thickness and texture. In some horses it justs fills its own canal neatly, rising towards its axis in a gentle curve, whose summit is two-tenths or three-tenths of an inch above the level of the bars; in others it seems much too thick and fleshy for the interior of the mouth, and projects in all directions. Now the volume of the tongue is a matter of very great importance, because the action of the mouthpiece is divided between this organ and the bars of the mouth; and the great nicety in bitting is practically to determine for each individual horse how much of the lever action is to fall on the tongue, and how much on the bars.

We started with the proposition that lightness or heaviness in the rider's hand depends *mainly* on the degree of equilibrium that the horse may have attained; but the reader will perceive that what is called softness or hardness of mouth must depend, to a certain extent, on the dimensions of the bit corresponding accurately with the interior conformation of this organ. The most perfectly adapted bit will not convert a raw remount at once into a trained horse, or to give him a proper carriage and feeling—all this is done gradually with

* The Segunda mouthpiece, which we knew only under another name till our attention was called to it by a correspondent, obviated this inconvenience partly, but has been abandoned wherever men take the trouble of fitting their horses' bits accurately.

the snaffle; but when the horse has once acquired the carriage and the degree of feeling that may be required, *then* no pains should be spared in bitting him correctly, otherwise all the previous labour is lost.

And this brings us to a very difficult and very important point. Each style of riding, to use a common expression—or every particular kind of service that may be demanded of a horse, to use a more correct one—demands a corresponding variety of carriage and degree of feeling, and consequently of bitting. On the three older continents we find the following styles predominant: School-riding, as a preparation for the circus or for military purposes, and what may be called natural riding. What we understand by this latter is not how the farmer jogs to market with a sack of wheat behind his saddle, but the methods of riding adopted and transferred from generation to generation amongst those nations or large communities who are compelled to live on horseback, either in self-defence, or to gain their existence, or for both reasons. This is, in fact, uncultivated military equitation; and the purely empirical principles on which it is founded are such that they readily accommodate themselves to the scientific principles of school-riding, with which it, however, only comes in contact in the east of Europe, if we except, perhaps, our own Indian possessions and Algeria.

Cossacks, Circassians, Hungarians, Poles—these are the European and western Asian representatives of the style of riding alluded to here. They furnish its best and most easily formed light cavalries, heavy cavalry having been originally the parent, and subsequently the pupil, of the school or manege. But in the west of

Europe this nursery for light cavalry has long ceased to exist. Perhaps the latest remnants of it were the Border-riders on the Scotch and English marches. Indeed, the few civilian riders that were to be found in France, Germany, Italy, Belgium, Holland, &c., till within comparatively few years, were riding-masters' pupils of one kind or another; and it was only in the British Islands that a numerous class of natural riders was to be found. The Continental riders have had, therefore, all more or less of a military or school type. There existed until recently only one general style of riding, saddling, bitting, carriage, and feeling amongst them, varying, however, very much as to correctness in different countries. Of late years, no doubt, a great change has taken place in this respect, and what is called *English riding* has been more or less successfully imitated *or* caricatured in various parts of the Continent.

Now the English type of riding has been formed by the national sports of racing and hunting, both of which require vehement straightforward riding in the first instance, and only a certain amount of handiness or dexterity in turning; and it is therefore neither desirable, nor indeed practicable, to give either the neck or head of the horse anything like the same position that other styles of riding admit of or require. *Therefore the system of bitting must be different to a certain extent.*

In fact, whenever it is possible, the jockey prefers riding his horse with a snaffle, and the best hunting-riders seem to be of the same opinion; and when they do use a curbed bit, it is most generally either as a sort of reserve for particular emergencies, or in combination

with a bridoon (using all four reins), by means of which the action of the bit is very much weakened. There are, however, a great number of racers and hunters whose tempers, or desire "to go," require the permanent use of a curbed bit, and hitting off the proper form and size of this is sometimes a matter of great nicety; for the bit that will prevent bolting, and enable the jock to ride a waiting race, may interfere with the horse's starting freely, or "laying himself out when called upon." No doubt the jockey that has a very close and steady seat, and places himself on the right part of his horse's back, will be able to ride almost every horse with a snaffle, because, being independent of the reins for his seat, his hand is light,—and this is the secret of snaffle-riding. Still it is often a matter of convenience or necessity to use a curbed bit, and it is therefore important even for the race-rider to know exactly on what principle its action depends.

Again, with the hunting man, the bit that enables him to hold a runaway may interfere with the horse in jumping. If he be not a mere rein and stirrup rider, he can no doubt get on best with a snaffle; but many a man does not like the labour of holding a pulling horse, and therefore prefers a bit. The difficulty a good rider that prefers the bit will have to contend with is to avoid the getting *too powerful a bit*, or the putting a suitable one into a part of the horse's mouth where it must act contrary to his intention. Well, what we profess to show is, that *light bits accurately fitted* are more to be relied upon than the most atrocious instruments of torture ever invented, and of which but too many are in daily use.

But we must in justice to ourselves, say here, once for all, that we know of nothing that can be done in the way of bitting for the man that depends for his seat on his reins—or on his stirrups, which comes to the same thing. The rider with a really good steady seat can jump his horse with precisely the same bitting that suits the school-rider or cavalry soldier, if he simply take a very long hold of the curb-rein with his bridle (left) hand, and use the right hand in front of it so long as his horse requires being "kept straight," and then the moment the horse rises to the leap, takes the latter away, leaving the horse to jump *altogether without* any feeling on the reins, which will *insure* his landing on all four feet instead of two only; but this requires a seat.* And it is precisely for this reason that it is absurd to talk of cavalry and hunting riding being antagonistic. The latter, if *well* done, confers boldness and vehemence in charging, and a disregard for common obstacles; but it should not be overdone or caricatured, for that would lead to bad skirmishing and slow rallying after the charge, by means of which great efforts of gallantry are frequently neutralised and converted into disasters, of which it would be easy enough to cite instancee.

For the road-rider good and careful bitting must always have an especial value, restiveness being but too often the consequence of the contrary; handiness and perfect control being an essential to safety, and great speed not being required, therefore the roadster

* This system has been practised in Hanover for the cavalry with great success, according to General Von Dachenhausen, but we ourselves used it many years since, and without being aware of this fact.

not only may but must be better "set up" and more finely mouthed than the hunter. Here, too, the grand thing is a seat independent of reins and stirrups, without which the best bitting will be of little value.

What should the *carriage* of the cavalry horse be? for this is what determines the bitting. It must favour the short sharp turnings and *voltes* of the school, without impeding the straightforward rush of the hunter; therefore the adjustment of the weight *and* the bitting must be such as to enable the horse to pass from the one style to the other, when required, with ease to itself and the rider. The rule of the manege is, that the frontal line of the head (forehead and nose) should be perpendicular to the horizon, the neck being brought up so that the mouth, and consequently the pull on the reins, should be on a line with the horse's back, so as to allow of the latter acting directly on the centre of motion. There are, however, but few horses so perfectly formed in every respect as to be able to assume this carriage and *maintain it in all their paces.* We have already pointed out the obstacles likely to arise from the conformation of the neck, head, and throat, and we may say that not one troop-horse in a thousand is capable of being brought to this standard of carriage, if it were necessary, which is by no means the case. We must therefore take a lower one, or rather one more universally applicable, and perfectly sufficient for the object in view. No better rule can perhaps be laid down than that of Lieutenant-Colonel von Oeynhausen, who says:* "I consider, as a general rule, that position of the head to be best with which the horse's paces are *clean* and

* 'Zäumungs Lehre,' p. 10.

free" (to be clean they must be equable and their rhythm perfect; to be free they must be made without apparent effort or marks of distress); "which allows him to turn willingly and without an effort or disturbance of his pace; to diminish or increase this without hesitation; to rein back, preserving a proper degree of feeling, and immediately to advance again freely if called upon."

Now, although a star-gazer with an ewe-neck, or a borer that can only go with his nose close to the ground, are totally unfit for military purposes, we must take average horses, and allow one to poke out his nose a little more than another; nor can we always help its coiling up its head and neck like a snail, so long as they go *clean and free*—which is precisely what Baucher's *encapuchonne* carriage of the head and neck does not favour; but the higher we get both head and neck without sacrificing *cleanness and freedom* of pace the better, if for no other reason than that there always must be *something* in front of the military saddle which keeps the bridle-hand at a certain distance above the horse's withers, close down to which the civilian rider can easily place it. Carriage is, however, not the result of bitting alone; it depends, as we have already shown in Part I., on a judicious system of saddling, packing, and riding, the bitting forming "*le couronnement de l'èdifice*," without which the remainder is of comparatively little use to the soldier, because he must *ride altogether with one hand*, and he requires his whole body, from the hips upwards, with the exception of this one hand, for the use of his weapons.

Good bitting, saddling, packing, and riding, are what render cavalry available and durable; they secure

efficiency, and therefore economy; of course they cannot insure judicious handling of the arm, nor affect the *morale* of the soldier beyond giving him a sense of security and power, which is, however, very valuable.

The reader will perceive, from the digression into which we have been led here, that the question of bitting cannot be considered separately from those of distribution of weight, carriage, and action; and it was in order to avoid erroneous impressions on this very point that we have thought it best to defer up to this moment all mention of those peculiarities of the interior construction of the horse's mouth which, taken together, constitute, so far as this organ itself is concerned, what is called a hard or a soft mouth.

There are two ways of expressing what a soft mouth is; we may either say this horse goes well on a light bit—which may be mainly a consequence of good carriage, temper, &c.—or we may say, a light bit will probably suit this horse best, *because it has a thin tongue, high and sharp bars, a wide tongue-channel, and fine lips.* But in truth, the relative thickness or thinness of the tongue is the main point to be considered, because, as has been already pointed out, the height of the bars is very nearly the same in all horses, and the width of the tongue-channel always bears a certain proportion to it. No doubt the bars have in some instances a flat and in others a sharp or convex upper surface, which, together with the greater or less fleshiness of the lips, makes a great difference; but in the end it comes to this, Does the tongue fill up its channel merely to the brim, projecting only a few lines over the surface of the bars, and therefore permitting the mouthpiece to exert a certain degree of pressure on the lat

ter? And this we would call a naturally soft mouth, so far as interior conformation goes.

A hard mouth, on the contrary, will be one in which we find a thick fleshy tongue, not only totally filling up its channel, but protruding over it, and rising high above the level of the bars, which makes the former appear narrow and the latter low, whatever their real dimensions may be; and if to this be superadded a flat surface to the bars and thick fleshy lips, we may forthwith set this down as a case in which an ordinary mouthpiece will exert its pressure mainly on the tongue and lips, conveying to the rider's hand the dull feeling of pulling against lead.

As a general rule, well-bred horses have the first-named conformation of mouth, and common brutes the contrary one; but it by no means follows from this that the former are all light and the latter all heavy in the hand: for the most aristocratic animal of all, the English race-horse, has generally a good tough mouth of its own, because it is taught from earliest infancy to lean on the bridle, and seek a fifth foot in the rider's hand; whereas, on the contrary, we often find a perfectly plebeian brute, with a tongue that overfills its mouth, and everything else in proportion, not only extremely sensitive to the action of the bit, but in fact totally averse to its contact—that is to say, "behind the hand," because it has miserable flabby muscles, unstrung tendons, and weak hind quarters.*

* A dishonest horse-dealer that really possesses talent will always avoid showing you a horse with an incipient spavin or other defect of the hind legs otherwise than on the lightest possible bridle: three-fourths of these arising from "savage bitting."

All this tends to show that it requires a considerable deal of judgment, practical knowledge of horses, and perfect understanding of what is required in each especial case, to enable one to undertake the task of selecting and fitting bits with any chance of success; whereas it is a matter that is most usually intrusted to certain classes of individuals who possess no other qualification than the habit of wearing green baize aprons or nether garments of a very peculiar description—viz., saddlers and grooms.

CHAPTER III.

THE CAVESSON—SNAFFLE—NOSEBAND—TRAINING-HALTER—RUNNING-REINS.

THE cavesson, not being a bit, is mentioned here only because some riders are in the habit of commencing the handling of young horses with this instrument, which, although most useful and admirable in the hands of a really skilful person, is equally dangerous and destructive in those of ignorant and brutal horse-breakers. If a young horse be lounged, it may be well to continue the use of the cavesson for a day or two after the operation has ceased, putting in hand-reins for that purpose, so that the animal may be gradually accustomed to the snaffle; but it is a great mistake to continue its use for any length of time in this way, because the horse learns thereby to lean on the rider's hand, which is what should be avoided from the very commencement. When used for the above purpose, the cavesson should have its nosepiece buckled low enough to rest on that point of the nose just above where the cartilage joins the bone, but particular care must be taken to prevent the cheek-straps injuring the eyes, which they are very liable to do.

Of all instruments employed in the handling, riding, or driving of horses, the common smooth snaffle is by

far the best and most generally useful; it is that by means of which the highest results can be obtained, whilst, on the other hand, less mischief can be done with it than with any other. There are some few riders whose seat is so firm, and hand so delicate, that they can venture on putting a curb-bit at once into a horse's mouth, but these are rare exceptions; and although, in former times, it was the custom to bit and curb the cavalry remount at once and send it to its work, especially in war time, this system, which produced almost as many restive horses as all other causes put together, has been finally abandoned everywhere, except amongst the Orientals, and the greater part of the handling is now done on the snaffle.

The great value of the snaffle is, that by its use the horse acquires confidence and insight into the means by which the rider proposes to direct its motions, and that it willingly assumes a steady and regular feeling, the action of the mouthpiece being gentle and capable of gradation; and in consequence of its acting on nearly the same part of the mouth as the curb-bit, it becomes a much better preparative for the latter than the cavesson can ever be, whilst it can never act in so violent a manner as either the one or the other.

It is precisely for this reason that the simplest form of snaffle—neither too long, too thin, nor too much curved, and with only one joint in the middle—is the best; but as there is no end of fancy and prejudice about various kinds of snaffles, it will be perhaps well to see into the real effect of some of those varieties of form and dimension that are so much relied on by the knowing ones. If the snaffle mouthpiece were simply two straight pieces of iron of equal thickness through-

out, jointed together in the middle, its whole pressure would, with most horses, come to act on the tongue exclusively, and, the base of the mouth remaining untouched, there would be therefore scarcely any action. To avoid this inconvenience, it is usual to make each half of the mouthpiece thicker towards the cheeks, and tapering off finer to the joint connecting them, by which means a portion of the pressure is transferred from the tongue to the bars; and, in addition to this, they may be slightly curved, which has the same effect. Let us suppose the length of such a snaffle to be just sufficient to allow the cheek-rings to come clear of the lips on either side, and we shall have nearly the whole action of the instrument exerted in the same direction as the pull on the reins,—a matter of no small importance, because it is the only true basis for an understanding between the horse's mouth and the rider's hand.

We may make our snaffle very thin in the centre, and very thick on each side, but we scarcely gain anything in power by so doing, because, although a greater amount of action is transferred from the tongue to the bars, the thick portion of the iron acting on the latter produces very little impression; this variety of form might, however, prove useful with a slight-built horse having a very thick tongue.

Another plan is, to leave the thickness of the iron unaltered, but increase the curvature; or to increase the length of the whole snaffle, so that it projects an inch or more at each side. Now either of these plans will, no doubt, increase the painful action on the bars; the latter especially, much practised by Irish horse-breakers, if exaggerated, will convert the snaffle into an instrument of torture; but the result of this in-

creased action is in a wrong direction—it ceases to be a fore-and-aft-pull, and is converted into a pincer-like twitch on the lower jaw, which becomes so painful that the horse tries to get the mouthpiece on his teeth, which is usually resented by sawing, restiveness being the most common result.

Some riders have recourse to a double-jointed snaffle, others again to a double mouthpiece, the joints being placed right and left of the centre; but these two forms produce the pincher-like twitch, and are therefore to be avoided if possible.

There is one abomination that cannot be sufficiently reprobated—namely, a snaffle twisted on one side and plain on the other, the pretence for using it being, that the horse is hard-mouthed on one side. Now it has been already pointed out that this disinclination to turn to one side is sometimes produced by a swollen gland under the jaw, or by a narrowness of the jaws themselves; and when anything of this kind is the cause, it is evidently pure brutality to apply sheer force. But many horses dislike turning—to the right, for instance—where no local impediment of this kind exists; and here it will be found, that circling in trot on the right hand, first of all very wide, and gradually narrowing in, the rider's right hand directing the pull of its rein towards the horse's *left hind leg*, whilst his left hand keeps the horse's head and neck *up* to the proper position, is a much more certain and also humane mode of attaining the end for which ignorant riders employ the one-sided twisted snaffle.

A snaffle twisted on both sides is a much less objectionable instrument, and may be safely used by *a well-tempered* and judicious rider who has a firm seat: it

should, however, be scarcely ever necessary to resort to this or any of the above-mentioned methods of increasing the painful action of what should be as nearly as possible a painless instrument,* because there are other and better means of attaining the same object.

Better means, because they are more durable in their effects, although they may require more time in the first instance; for, apart from all other considerations, there is this great objection to all the contrivances referred to here, that when you take them out of the horse's mouth you find yourself at best just where you were before, and still more likely not nearly so well off, because the animal's temper will have suffered.

In the great majority of cases, when a man finds that his horse lies heavy in his hand with a plain smooth snaffle—in fact, when he cannot hold him—he looks out immediately for something sharper— a twisted mouthpiece, or some contrivance of the kind—and seldom takes the trouble to examine how it is that the animal contrives to set the cold iron at defiance. If he did so, he would generally find that this is accomplished by getting it out of its proper place on the bars, and shifting it up to the thick part of the tongue, which the horse can only do when there is nothing to prevent his opening his mouth as wide as he pleases; for, if he can do *this*, he *can* always set the rider at defiance. In former times a noseband used to be employed, even with snaffles, for the purpose of preventing this; but the noseband has been very generally abandoned, ex-

* It cannot be too often repeated, that the first object to be attained in handling horses to gain their confidence, and to lead them by degrees to an understanding of the rider's wishes, which they will always readily fulfil, if they are able.

cept on military bridles or harness, at least in this country.

The chief reason given for abolishing the noseband was, that it was supposed to interfere with the horse's breathing, especially during the long-continued gallops of the hunting-field, &c.; and it was on the same account considered to be, *a fortiori*, wholly unfit for racing purposes. This was, perhaps, not a good reason for rejecting it altogether during the first handling of young horses, as it would have been easy to lay it aside afterwards when they came to their field work; but the truth is, that the noseband was placed so high up above the angles of the horse's mouth that it could not prevent the animal opening its mouth and doing what it pleased with the bit, unless it was buckled so tight as really to interfere seriously with the respiration, even at the more moderate pace of a trot or walk—besides other imperfections, to which allusion shall be made lower down. This was long a stumbling-block in the way of the rational treatment of colts and fillies, and was probably what led indirectly to the invention of various instruments of torture known by the name of "capital mouthpieces;" but this difficulty has been at length got over, and we are in possession of a contrivance which enables us to effect what the old-fashioned noseband never could.

This is the training-halter (Reithalfter), invented, we believe, by Lieutenant-Colonel von Oeynhausen, of the Austrian cavalry, or at least introduced by him into the Central School of Equitation at Vienna several years since. To understand perfectly the great value of this halter, it is necessary to allude to one more disadvantage of the old-fashioned noseband, in addition

to those already enumerated, which was, that when the reins of the snaffle came to be shortened, the cheek-pieces of the headstall bulged out to the right and left up to the point at which they were held fast by the noseband, and being stopped there, a certain proportion of the pull on the reins was transferred from the mouth-piece to the noseband, where it, of course, was wholly inoperative; so that this latter, instead of promoting the action of the former, actually interfered with it, making the horse lean still more on the hand than hitherto.

It is as well to mention here that the method now introduced of passing snaffles, used for draught-horses, through rings at the lower end of the checkpieces, instead of buckling them on directly as heretofore, is grounded on the same principle—that of making the action of the mouthpiece altogether independent of the noseband.

But these ring-snaffles do not, of course, prevent the horse opening its mouth too wide, nor can the old-fashioned noseband do this effectually either; the training-halter does so most efficiently, and in the simplest manner. It consists of two cheek-straps whose upper ends are made fast in the buckles of the snaffle-headstall.* These cheek-straps support, by means of two rings, a noseband composed of three pieces: 1. The noseband proper; 2. A strap about 7 inches long, sewed into the ring on the off side; and, 3. A shorter strap, 2 to 3 inches long, and terminated by a buckle, which is sewed into the ring on the near side. The cheek-straps are buckled into the headstall outside, so

* It is, of course, necessary for this purpose that there should be a buckle on each side.

that the noseband comes to hang below the rings of the snaffle, and the two back straps are then buckled together, so that the longer one comes to lie in the chin-groove, as a curb would with a bit, leaving, of course, a sufficient play to the horse's under jaw, without allowing the animal to open it beyond a certain distance, and thus securing perfect independence to the mouthpiece, and permitting of its acting in the proper place and direction.

It must, however, be well understood that this halter is not intended to be permanently employed; its great value is, that it enables us, by preventing the young horse from escaping the action of a light snaffle mouthpiece, to avoid the necessity for employing sharp ones; in fact, all violent measures are thereby rendered unnecessary during the period of training or handling; and when this is once over, we may lay aside our halter, and either use the plain snaffle, or put a curbed bit into the animal's mouth, which has been by this very means perfectly prepared for either; and that this is a real advantage we must admit.*

It is scarcely necessary to remark that the snaffle should neither be pulled up *too* high in the horse's mouth, nor suffered to hang down *so* low as to interfere with the tusks or front teeth; its proper place will be about one-fourth of an inch below the *angle* of the mouth; and in this position a plain smooth mouthpiece, if aided in its action by the training-halter, will be found to answer every purpose, and afford the best

* It is but justice to confess that the writer of these lines having become acquainted with the training-halter when he was an old rider, was at first incredulous as to its value, but he soon became a convert.

possible means of mouthing young animals. Training race-horses is so distinct and peculiar a branch of riding, that it seems almost presumptuous to offer even a suggestion on the subject; but we are quite certain that the halter here described would be of great value to trainers, saving them much trouble, and eventually diminishing the number of bolters and difficult starters very considerably, and thus giving many a horse a fairer chance than he would otherwise have. Of course it is not meant that the halter should be used otherwise than during the first period of handling; in actual running it would interfere too much with the animal's respiration.

The great value of being able to keep the horse's head in a proper position has been frequently dwelt upon in these pages. It is a matter with which almost every rider is acquainted, and the number of martingals, running-reins, and other contrivances invented especially to attain this object furnish an evidence of its great desirableness. Some of these are intended to act on the horse's nose, and are therefore nearly worthless; others, again, are fixed, and consequently more or less dangerous, besides requiring frequent alterations of buckles, &c., to make them suit; a third class act on the reins, and, interfering with the direction in which the pull on the latter is exercised, are wholly inadmissible; some few act directly on the bit or snaffle. To be really efficient, safe, and applicable under all circumstances, the running-rein or martingal should act directly on the snaffle or bridoon itself,* be wholly independent of the reins, and afford

* It is both useless and dangerous to interfere with the action of the bit by means of such contrivances.

a facility for adjusting its action, or altogether putting an end to it, without altering either buckle or strap, or even halting the horse if in motion.

As a general rule, when a horse has been once properly broken in and bitted, it should not require any contrivances of the sort: its use being continued after a certain period is an evidence of something being wrong. Sometimes this is incapable of remedy, being a consequence of some peculiarity in the animal's build, and then there is no help for it; but a good running-rein, possessing the qualities mentioned above, affords very frequently most valuable aid in the first handling, and will, if judiciously used, save the rider a great deal of trouble, the horse an equal quantity of ill usage, and, finally, simplify all questions of bits and bitting in a wonderful manner.

The best of all these contrivances hitherto invented is perhaps that known under the name of Seeger's running-reins (Schleif-Zügel), being perfectly simple, safe, and applicable to all styles of riding. M. Seeger, the justly celebrated riding-master at Berlin, and undoubtedly at the head of his profession in Europe, first brought it forward. It consists of three distinct pieces, the chin-strap, the running-rein, and the martingal. The chin-strap consists of a leather curb furnished at each end with a small buckle and strap, by means of which it is attached to the cheek-rings of the snaffle or bridoon, the entire length, including the buckles, to be 6 inches; these latter, when covered with leather, just wide enough to admit a strap $4\frac{1}{10}$ inches wide, and $2\frac{1}{2}$ long, projecting over the buckle, *behind which* it is sewed on to the body of the curb. This curb

carries a rounded strap in rear, supporting an ivory ring which may have an internal diameter of somewhat more than 1 inch (say $1\frac{1}{8}$), the external one being $1\frac{5}{8}$, leaving, therefore, the thickness of the ivory about $\frac{1}{2}$ an inch.

The running-rein is in one straight piece, $8\frac{1}{2}$ feet

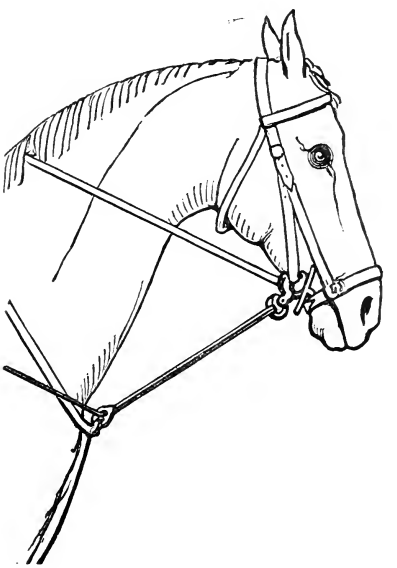


Fig. 8.

long from the buckle to the point, towards which latter it tapers off somewhat, its width being otherwise that of a common bit-rein, $\frac{6}{10}$ of an inch. An 18-inch strap of the same width is sewed on behind

the buckle and pierced with five or six holes. The martingal has the same contrivance, as usual, of a buckle for forming a loop through which to draw the girths; but the other end of the strap (inch wide), instead of being split into two narrow ones, each carrying its own ring, is left of its full width, and carries one ivory ring of $1\frac{1}{2}$ inch internal diameter and $2\frac{1}{4}$ external, leaving, therefore, $\frac{3}{4}$ of an inch for the thickness of the ivory. The usual length of the martingal from the ring to the buckle is $3\frac{1}{2}$ to 4 feet, the latter affording scope for adjustment; and there is, of course, a neck-strap for carrying the martingal, which is too well known to need description.

Let us now suppose the horse to be saddled and bridled with a plain snaffle, the first step will be to buckle the chin-strap into the rings of the mouthpiece, the martingal having been previously put on in the usual manner, and its length so adjusted that the large ring it carries may just reach the level of the joints of the shoulders. The next step will be to buckle one end of the running-rein into a D ring attached for that purpose to the pommel of the saddle on the near side; the other end of this rein is then carried forward through the ring of the martingal (from rear to front), from thence through the ring of the chin-strap from left to right, and back again through the martingal ring (from front to rear), from whence it goes to the rider's *right* hand. It is evident that a pull on this running-rein will act directly on the mouthpiece, drawing it back and somewhat downwards towards the horse's breast-bone; the great value of the whole arrangement being, that by taking the running-rein and

right snaffle-rein into the right hand, and the other snaffle-rein into the left ditto, we can place the horse's head in any position we desire, and get a pull on the horse's mouth either horizontally, upwards, or downwards as may seem expedient.*

The training-halter offers no obstacle to the employment of this running-rein; indeed they may be may advantageously used in combination, and afford a most perfect command over the horse's head without the slightest approach to violence, and by slackening the end of the running-rein held in the right hand, its action may at once be put an end to, unlike all other contrivances of this nature, which are too apt to get hitched.†

The use of Seeger's running-rein for race-horses is perfectly unobjectionable. It gives the rider an immense power over his horse, which may be used momentarily, to check an attempt to bolt, for instance, and immediately relaxed, or it may be kept constantly in moderate action—for instance, with a horse inclined to throw up his head too high—and all this without interfering with his running; on the contrary, by using this rein one may dispense with sharp snaffles or curbed bits which so frequently have that effect. Seeger himself, however, thinks it unsuited to racing or hunting purposes.

But it is chiefly in the handling of young animals,

* The advantage as compared with other running-reins is, that the position of the horse's head depends on the length of rein grasped, and not on the force applied.

† Mr. Childs, saddler, St. Mary's, High Street, Bedford, has patterns of the training-halter and the running-reins.

whether for the saddle or draught, that these contrivances are valuable, because they enable us to attain our object gradually and noiselessly, as it were, although with perfect certainty; above all, they afford us the means of avoiding all unnecessary violence, or any approach to ill treatment.

CHAPTER IV.

THE LEVER—THE BIT AND CURB—BITTING—THE BRIDLE.

With a plain smooth snaffle there is no question of lever action; the amount of power applied to the reins is conveyed unaltered in quantity to the animal's mouth: to use a scientific expression, there is none of that mechanical advantage obtained which a mechanical power alone is capable of conferring. But if we combine Seeger's running-rein, which acts on the principle of a movable pulley, a certain amount of power applied to that rein will produce double the effect on the mouth that it would if applied to the snaffle-rein alone.

A still greater amount, however, of mechanical advantage may be obtained by means of a lever—and a bit furnished with a curb of a proper length acts as such. There are, we know, several kinds of levers, and it will depend altogether on the manner in which the bit and curb are arranged, whether we obtain a lever action that is favourable to us or quite the contrary; it is therefore necessary to say a word or two on the principles of lever action.

In the first order of levers the power is applied at one end, the weight being placed at the other, and the fulcrum or prop between the two, dividing thus the lever into two arms, a longer and a shorter one. The

mechanical advantage obtained is proportionate to the relative length of these two arms. Thus if *PF*, fig. 9 (*a*), be equal twice *W F*, a power equal 1 applied at *P* will counterbalance a weight equal 2 applied at *W*; but, as regards our purpose, it more especially necessary to observe that the power and the weight move in

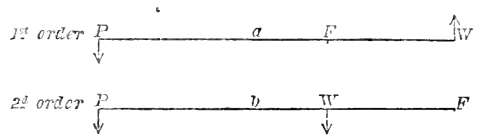


Fig. 9.

opposite directions, or rotate round the fulcrum or prop, as is shown by the direction of the arrows. Applying this to a bit, the cheeks of which represent the lever, there can be no question as to where the power is applied, being the lower ring to which the rein is attached, nor as to the direction in which it is intended to act, being towards the rider's hand; and if a bit act as a lever of the first order, the fulcrum or prop must be represented by the bars of the horse's mouth on which the mouthpiece acts, and the pressure of the curb* on the chin would necessarily represent the weight to be raised. But it has been shown that, in levers of the first order, the power and weight move in *opposite* directions in their rotation about the prop; in this case, therefore, the horse's chin, in consequence of the pressure exercised by the curb, should move forward—that is to say, away from the rider's hand; and the greater the lever power of the bit, and the stronger the pull on

* We use the word curb for curb-chain, and bit or curbed-bit for what is sometimes called curb.

the rein, so much the more would the horse be induced to stick out his nose,—an occurrence that is by no means infrequent, and at which some riders and drivers are very much astonished.

Now, in fact, there is no *weight to be raised* in the purely mechanical sense of the expression—it is a question of the infliction of a certain amount of pain from which the horse shrinks; and if the curb act *more painfully* than the mouthpiece, in consequence of its construction or position, we obtain the action of a lever of the first order, which we should never desire. Some people are indeed regardless of the amount of pain they inflict on a horse, and go on increasing this painful action in both directions, without, of course, obtaining any real advantage, which is precisely what we would desire to see put a stop to; and in order to this let us examine into the action of another kind of lever.

In a lever of the second order the power and prop act, or are placed, at the opposite extremities of the lever, the weight being between the two: the mechanical advantage is proportioned to the relative distances of the power and weight from the prop. For instance, if *PF*, fig. 9 (*b*), be equal three, and *WF* equal one, these numbers will express the relative amount of power gained; and it is to be observed that the power and the weight move in the same direction in rotating round the fulcrum. This is what we want for bitting: the weight in this case is represented by the pressure on the bars of the mouth; the curb acting thus merely as a fulcrum, the horse's head follows immediately the pressure on the bar in the direction of the rider's hand.

It is very evident that the direction in which the bit

acts depending altogether on the relative amount of painful pressure exercised by the bit and the curb, the horse's head will follow the rider's hand, even though the curb lacerate his chin, if only a greater amount of torture be applied to the bars of his mouth, the poor animal being left to deduce from the balance of pain what the rider's will may be. This is the system of bitting employed by the Arabs and other Orientals at the present day; our Crusader forefathers borrowed it from theirs, and, strange to say, it is still more or less practised amongst us.

It is, however, quite possible to economise for ourselves all this surplus ingenuity in devising instruments of torture, and to spare our horses the infliction of it, merely by adjusting our bits altogether on the principle of a lever of the second order—that is to say, by converting the curb into a simple prop or fulcrum for the lever action on the bars of the mouth, which may be effected by rendering it perfectly painless, so that then the small amount of pressure exercised on the bars acting in the proper direction, and not being counteracted elsewhere, is the sum total of pain it becomes necessary to inflict, and even this may be reduced to a minimum.

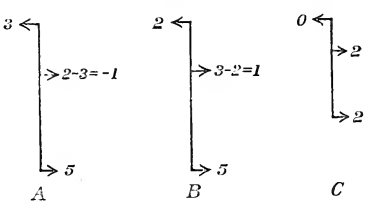


Fig. 10.

The adjoining fig. 10 shows that, supposing a power

equal to 5 to be applied to the reins, it may, in consequence of various arrangements of the mouthpiece and curb, be made to exercise an amount of painful pressure as at *A*, where 3 parts act on the curb and only 2 on the mouth, which will make the horse bore into the hand; or as at *B*, where 3 parts act on the mouth and only 2 on the curb, so that 1 really remains available. Whereas, by reducing the painful action of the curb to 0, as at *C*, we find that the whole amount of action may be applied to the mouth, and therefore itself reduced to 2.

Here we have a key to the whole theory and practice of bitting, and there is no difficulty in understanding that its immediate consequence will be to render bits of small dimensions equally efficient and much more certain and reliable in their action than the monstrous pieces of ironmongery usually manufactured and sold ever can be: and we now proceed to enter into further details.

The first question that naturally presents itself is, the absolute length of the lever—that is to say, of the upper and lower cheeks of the bit taken together; the next, that of their relative proportions to each other. Before going into the consideration of these it will be well to clear up one or two preliminary matters, merely premising what is self-evident on inspection—namely, that a bit may be regarded as a pair of levers connected together by the mouthpiece. At first sight this might lead to the conclusion that the centre of the rivet on each side is always the point from which the length of the upper and lower bars is to be measured. This is, however, only true for those forms of mouthpiece which consist of a port and two lateral straight portions; but

if the whole mouthpiece form one curve, the line of bearing—that is to say, the line connecting the two points of the mouthpiece which rest on the bars of the horse's mouth—does not coincide with the axis of the bit passing through the centre of the two rivets, which must be taken into account in estimating the relative lengths of the upper and lower cheeks of the bit.—See fig. 11.

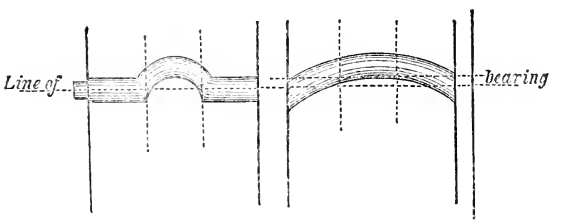


Fig. 11.

The measure for the length of the upper cheek of the bit, taken from the "line of bearing" to the point at which the curb-hook acts, is the height of the bars of the horse's mouth, which, as has been shown in a previous chapter, is pretty nearly a constant quantity—namely, $1\frac{5}{16}$ English inches, decreasing with very small horses and ponies to $1\frac{4}{16}$; therefore, rejecting *too* great nicety, we may say *that* $1\frac{3}{4}$ *inches* is the proper length for the upper cheek—very seldom less, and hardly ever more.

It would be very easy to demonstrate mathematically why these two dimensions should always correspond, but we prefer the simpler and more obvious way of showing what the consequences of a departure from the rule must necessarily be.

If one puts a bit into a horse's mouth *without attaching a curb to it*, when the reins are drawn the bit turns right round, and its cheeks or branches come to lie in the same line as the reins. There is no lever action whatever, because there is no prop, and a snaffle or bridoon would, on account of their centre joint, be much more efficient. The same thing, too, will happen if the curb be *very* loose: the bit is then said to "fall through"—in fact, it is nearly useless. The opposite fault to "falling through" is when the bit "stands stiff" without any play, the slightest pull on the reins causing the horse great pain, and, most probably, just in the wrong place—that is to say, externally; for this stiffness or rigidity of the bit is very often produced by a *tight* curb, and therefore the horse, instead of following the rider's hand, pokes against it. Good bitting will be equally removed from stiffness and falling through: it lies between these two extremes.

The length of the upper cheek of the bit will, however, *of itself* cause this instrument either to stand stiff or to fall through, if it exceed or come short of the height of the bars of the mouth, as is shown in fig. 12, where *d e* represents this latter dimension, *d b* an upper cheek precisely equal, *d c* one of only half the same length, and *d a* one double the same. When a pull of the rein acts at *f* on the lower bar, the curb will be drawn closer to the chin, and the mouthpiece to the interior of that organ; and supposing the amount of this "closing up" to be equal in all three instances, the bit with a long upper cheek, *d a*, will assume the position *á d f*[1]. It will be *stiff*, and the curb acting *upwards* in the direction *e á*, will press on the sensitive part of the jaw. Moreover, there will be *no* lever

action, the two arms of the lever being equal; the horse will therefore bore in the rider's hand. On the other hand, the bit with the short upper cheek *d c*, equal half *d e*, will assume the position *c′*, *d*, f^3—that is, it will *fall through*. The curb will no doubt remain in the chin-groove, and act *forwards* in the direction *e c′*, but forming a very acute angle with the branches of the bit itself, will have scarcely any value as a *prop*. The lever action, however, will be very

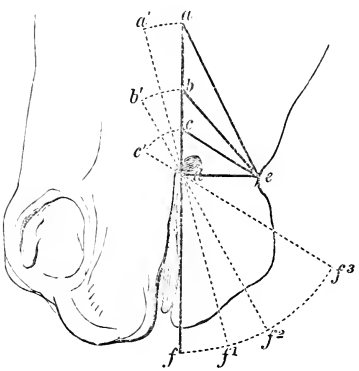


Fig. 12.

great, the lower branch *f d* being to the upper one *d c* in the proportion of 4 to 1. In fact, it will be too great, and therefore reduces the prop to a nullity.

The intermediate upper cheek *d b*, equal *d e*, will assume the position *b′ d* f^2; it will neither be stiff nor fall through: the curb will remain in the chin-groove, acting obliquely forwards in the line *e b′*, and will afford a sufficient prop or support; and the lower branch of the lever, *f d*, being in the proportion of 2

to 1 to the upper one, *d b*, there will be sufficient lever action.

It will be now easy to understand how it comes that people, in order to prevent a bit with a very short upper cheek falling through, are driven to using a very tight curb, the result of which is, that the whole action is transplanted from the interior of the mouth to the chin; as also that, in order to prevent one with a very long upper cheek standing stiff, they use a very loose curb, which has the effect of making the bit fall through; and this—what is very common, nay, almost invariable in this country—immensely long bit is pulled up as high as it will go into the horse's mouth, and then a loose curb attached, which great piece of ironmongery of course not only falls through, but acts nearly altogether on the exterior of the horse's jaw; whereas a much smaller and lighter bit, if adapted to the mouth, would be much more efficient.

Some portion of the objection to the long upper cheek referred to above—namely, its affording no lever action—may be remedied by making the lower cheek proportionably longer; and this is precisely what the ironmongers do, and, moreover, are encouraged to do by ignorant buyers. As has been already shown above, with reference to fig. 10, we are thereby driven to use much severer, that is, more painful, bits than are really necessary; besides which, there is another reason why we cannot go beyond a certain length with the lower cheek. This is on account of the angle at which the rein acts on the latter.

We have already pointed out how much depends on the angle at which the power is applied to a lever, and that a right angle is the most favourable one for this

purpose, which may be shown in a manner perfectly independent of theory. If the bit, fig. 13, were pulled in the direction of *c*, it would evidently have no other effect than to pull it downwards, and out of the horse's mouth, if the headpiece of the bridle did not prevent this taking place; and if the pull were made in the direction *b*, it would only lift the bit up till the angles of the mouth stopped it. In neither case would there be the slightest lever action; and the nearer any other direction, *g* or *h*, approached these perfectly inoperative ones, *b* or *c*, the less would be its value; and it is therefore evident that the direction *a*, which is equally remote from both, must be the most efficient —which is, however, precisely the right angle.

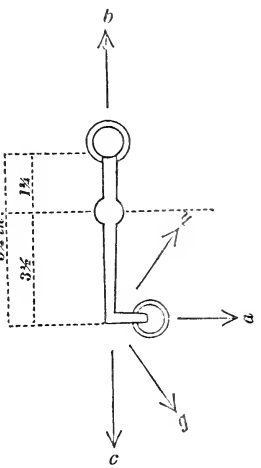


Fig. 13.—Angle formed by rein with bit.

Now a very long lower cheek, or a very low carriage of the horse's head *à la* Baucher, or a very high pack in the front of the saddle,* will always have the effect of bringing the rein to act on the bit at an unfavourable angle; and when we come to look at the bits that served as models for old equestrian statues, we find that the immense long lower cheeks of these were bent backwards so as to form an angle with the upper cheeks

* See Plates VI. and VII., top figures.

for the purpose of securing the action of the rein at a right angle, or nearly so—which, however, did not and could not answer the purpose intended. If the inventors of these frightful bits had had any real knowledge of the laws of mechanics, and the application of lever power, they would have found that the same amount of useful action would have been much more certainly obtained by a much shorter lower cheek, without incurring the very serious disadvantage of lifting the bit, as it were, in the mouth, which always must have the effect of causing the curb to mount up out of the chin-groove, and therefore produce conflicting impressions, tending to neutralise one another and puzzle the horse. Moreover, the longer the lower cheek the greater will be the space through which the rider's hand has to move in order to produce a given amount of action. It will be therefore slower, although more powerful, and consequently more unequal, rendering it very difficult for the majority of riders to hit off exactly the precise amount of pull required.

Having thus arrived at the conclusion that the absolute length of the lower cheek should be diminished as much as possible, and also laid it down as a rule that a length of $1\frac{3}{4}$ inches is in all cases sufficient for that of the upper one, it is not difficult to ascertain what the relative proportions of the two should be, which would, of course, give us the absolute length of the former. And here we encounter the only useful general rule that bit-makers in general seem to be acquainted with; namely, that *the lower cheek should be twice as long as the upper one*, which, increasing the lever action in the proportion of three to one, should be under all circumstances ample. But the bit-makers, although adher-

ing to this proportion, but too frequently make the lower cheek inordinately long, because they have no standard of length for the upper one; whereas, if we adhere to the rule laid down above of $1\frac{3}{4}$ inches for the latter dimension, we have $3\frac{1}{2}$ inches for the former one, both measured from the line of bearing (see fig. 11), and $5\frac{1}{4}$ inches for the entire length of the bit measured from the point at which the curb-hook acts above to that where the lower ring acts below (see fig. 13). This will be the maximum required, and will be found to suffice in all cases; with very small horses or large ponies the upper cheek will have to be reduced to $1\frac{1}{2}$ inches, the lower one to 3 inches, leaving the total equal $4\frac{1}{2}$ inches, which will be about the minimum.

Some authorities, amongst these Von Weyrother, recommended the measured width of the mouth to be taken as a rule for the length of the lower cheek: this varies, as we have already shown, from $3\frac{8}{16}$, $4\frac{3}{4}$ to $5\frac{1}{16}$ inches, and would be, therefore, somewhat more than the rule given above; but Von Oeynhausen adheres to this latter, and we are convinced that he is perfectly justified in so doing, because we have it in our power, by means of the mouthpiece, to effect the nicest adjustment that can be desired, and there is a much better chance of having the proper proportions adhered to by the bit-makers if we give them *one* or *two* fixed quantities, instead of a number of variable ones.

Next to the dimensions of the cheeks of the bit, the most important point to be considered is the curb; or rather, the position of the bit in the horse's mouth, taken in conjunction with the line of the curb, is what determines in the first instance the height of the upper

cheek, and consequently that of the lower one. *The curb must lie in the curb-groove, without any tendency to mount up out of it on to the sharp* bones of the lower jaw, otherwise, as we have seen, it ceases to be a painless fulcrum, and renders the best-constructed bit uncertain, or even still worse, in its action.—See fig. 11.

The only certain way of attaining this perfect painlessness of the curb, on which so much depends, is—supposing, of course, this latter to be properly constructed and of the requisite dimensions—by *placing the mouthpiece on that part of the bars exactly opposite to the chin-groove*; it is only in this position that we have the right-angled triangle, *e d b*, shown in fig. 12. But there is another reason for this: we find here the portion of the bar of the horse's mouth best suited for the action of the mouthpiece—that space that intervenes between the grinders and the tusks, where these exist. With respect to the latter, it is necessary to mention that there is great irregularity as to their position in the mouth, some horses having them relatively higher, others lower; nor do the tusks of the upper jaw always correspond with those of the lower one, and mares have very frequently no tusks whatever; it is therefore quite impossible to determine the proper place for the mouthpiece with reference to these teeth, although even the cavalry regulations continue to do so: the chin-groove, in consequence of its relation to the action of the curb, is the essential point to be considered.

Almost all the defects and absurdities of bits and bitting may be traced to ignorance of, or inattention to, this very simple rule. A man puts a bit into his horse's mouth—let us suppose that it is a well-proportioned one

in every respect; he fixes it at the prescribed "inch above the lower tusk" if he be a soldier, or draws it up into the angle of the lips if he be a civilian: he may just happen to hit off the right place, and if so, even an ill-shaped bit will work tolerably; he is content with his work, and thinks he has mastered the difficulty. But in ninety-nine cases out of a hundred the mouthpiece lies higher than it should; and if, in addition to this, the upper cheek of the bit be, as it so frequently is, a quarter of an inch too long, then the curb mounts up out of the chin-groove and causes so much pain that the horse, to escape it, bores into the rider's hand. He will then, perhaps, try a longer curb or a shorter one; the bit will either fall through or be stiff, and he concludes that he must have a sharper one, and has recourse to some instrument of torture; and so it goes on from bad to worse, till he gets rid of the poor ill-used animal.*

The best fitting bit, even when placed in the proper place, will not work well unless the curb be properly constructed and exactly of the length required. Taking all in all, a double chain worked quite flat, without prominent edges, and which *when twisted up* to its

* This is no imaginary case: the author once saw a nice little thorough-bred horse at Ostend, and a few months later at Dublin, as second charger of a light cavalry officer of the garrison. It was set down as an incurable bolter, and passing through the hands of the riding-master, adjutant, and several officers, was finally sold, as dangerous to ride, for £15 at a fifth-rate auction-mart. The purchaser, a ladies' doctor, brought it to the author, who after curing its dreadfully lacerated mouth and jaws, bitted it properly with a very light bit, which enabled the doctor to ride it within a week at a review of the regiment in question, and for several years afterwards, without ever bolting or being troublesome: never was there a better-tempered creature.

full extent, *does not overtwist*, is the best kind of curb. Leather would be in some respects better than a chain; it is, however, not only perishable, but also subject to stretch or contract when exposed to moisture; and after having been once or twice thoroughly soaked, becoming hard and inflexible, it is more likely to injure the horse's chin than a well-made chain.

It is very clear that the narrower the chain is made the more likely it is to cause pain, which is just what we want to avoid, and we should therefore endeavour to make it as broad as possible. The vulgar notion of a sharp curb is, as the reader perceives, a monstrous absurdity. But there is a limit to this: if it be so broad as to fill up the chin-groove completely, there will be always a danger of its upper edge coming in contact with the sharp cheek-bones at every, even the slightest, pull on the reins, and getting up a sore which immediately interferes with the action of the bit; we must therefore select a curb that *does not altogether* fill up the groove. It is not easy to give any special dimension for the width of the curb-chain: eight-tenths of an inch will be found to answer the purpose very generally, but if we can use a broader curb without injuring the chin-groove so much the better; it is more likely to be flat and painless. Curbs are frequently made to taper off a little towards the ends: there is no objection to this, except that, being more difficult to manufacture with precision, they are seldom so well made as the curb that is equally broad throughout. Single-chain curbs made of flat links may be good, if not too broad or sharp-edged; the plain double chain will be probably better made, and therefore preferable: the great thing is to avoid the infliction of pain; and if

we are sometimes compelled to use a very narrow curb, on account of the chin-groove being sharp and narrow, it will be well to have a cloth case to run over it, which may be taken off after use each time.

It is not possible to give an exact dimension in inches for the length of the curb; a little reflection will show that it must always bear some special proportion to the width of the horse's mouth and the height of the bars, the latter of these quantities being nearly constant, whilst the former one is variable, as has been shown above. We must here anticipate, to a certain extent, the contents of the next paragraph. In order to render the action of the curb as painless as possible, it is absolutely necessary that it should press upon the greatest extent of surface that can be made available for the purpose, for which reason, of course, we require this instrument itself to be flat, and as broad as the chin-groove will allow. If the mouthpiece have exactly the same width as the mouth, the curb will wrap close round the chin, pressing equably over a large surface; but if, on the contrary, it be too wide, the curb will trend away right and left; and if the excess of width amount to half an inch or an inch, it will bear altogether on one spot and get up a sore,* although it is really longer than it should be.

It will be found that the proper length for the curb is about one-fourth more than the width of the mouth, the curb-hooks not being included in this; or, if we take these into account, the total of the curb

* The author once found some thirty or forty horses in one squadron each with a little round ulcer on the chin in consequence of the bits being too wide.

and the two hooks will be once and a half the same dimension.

The curb-hooks form an important item in the arrangement. It was formerly the custom to have one hook attached permanently at the near side of the bit, and another of a somewhat different form to the off side of the curb, but it has now become usual to attach a pair of hooks of exactly the same shape and dimensions, which is a great improvement: the proper length for these is three-fourths the height of the upper cheek, or about $1\frac{1}{4}$ inches.

The above length of curb applies to what is really employed between the two hooks, but it is usual to have one reserve link at the offside, and two of these at the near one, which latter are convenient, or rather indispensable, for catching a proper hold of the curb when being hooked on.

We now have gone step by step through the several details connected with the bit considered as a lever—namely, its cheeks, and the curb with its hooks, which represent the fulcrum or prop. There remains the mouthpiece, which is of equal if not greater importance as the part of the instrument through which the immediate impression is made on the mouth, and therefore generally placed in the foreground by writers on this subject. It appeared, however, to us to be a matter of great importance to make it perfectly clear, in the first place, that the entire action of the bit should be concentrated on the mouthpiece, that the operation of the curb should be confined wholly to the function of a painless fulcrum, and that there are certain narrow limits to the size of the upper and lower bars which form the cheeks of the instrument. The

form and proportions of the mouthpiece must be deduced wholly from the interior conformation of that part of the mouth on which it is intended to act, and these are, the tongue in the centre and the bars of the mouth on each side. It has been already pointed out that the relative hardness or softness of the mouth, so far as this depends on the conformation of this organ itself, is a consequence of the greater or less thickness of the tongue, and the greater or less sharpness and sensitiveness of the bars. The soft fleshy tongue is, of course, much less sensitive to pressure than the bony bars; covered only with a very thin membrane; and consequently, if we used a perfectly straight unjointed mouthpiece of a moderate thickness, this resting wholly on the animal's tongue would, notwithstanding a certain amount of lever action, be the very lightest form of bit that could be well devised; in fact, a good snaffle would, on account of the joint, be more powerful. On the other hand, if by means of what is called a "port" we remove all pressure from the tongue and transfer it to the peculiarly sensitive bars, we obtain, with precisely the same amount of lever action as before, a much greater amount of power—in fact, the sharpest form of bit that it is generally advisable to use. Now between these two extremes there is a wide range, and the whole art of bitting consists, so far as the mouthpiece goes, in determining how much of the pressure shall fall on the tongue and how much on the bars, and we are thus enabled, by means of an almost infinite system of gradations, to obtain exactly the degree of action required in each particular instance by the nature of the service we demand, whatever the relative thick-

ness of the tongue and sensitiveness of the bars may chance to be.

But there is one essential to be attended to—namely, that the portion of the mouthpiece destined to rest on the tongue and the bars respectively should keep their proper places, and this can be secured only *by making the mouthpiece of precisely the same width as the horse's mouth.* For it is very evident that if a mouthpiece furnished with a port be *too wide,* a very slight pull on one rein will suffice to displace it, so that the bar at that side gets either altogether under the port, in which case the whole pressure is thrown on the tongue; or partially so, when the corner of the port will, by being pressed into it, cause great pain—in fact, the action of the mouthpiece, whether with or without a port, becomes altogether irregular and cannot be depended on. On the other hand, if the mouthpiece be too narrow, the lips are jammed in over the bars, the mouthpiece rests more or less on them, and the whole action is disturbed, besides which the horse is sure, sooner or later, to get ulcerated lips.

*The first grand rule must be, therefore, in all cases to make the mouthpiece precisely so wide that, when placed in the mouth, it fits close to the outer surface of the lips without either pressing on these or being subject to be displaced laterally.**

But it is also evident that the different parts of the mouthpiece must be exactly fitted to the interior of the mouth; that is to say, that those portions destined to act on the bars of the lower jaw should come into contact with them, and with them alone, and in the degree required; and that, on the other hand, that

* See note at foot of p. 137.

portion destined to act on the tongue should be of exactly the proper dimensions and form. Of course there is a great difference in this respect between smooth mouthpieces and such as have a port; in fact, it is only as regards the latter that the dimensions are important. Where, then, a port exists, its *width* should be exactly that of the tongue-channel, as otherwise it would either intrench on the space allotted to that portion of the mouthpiece required for the bars, and produce the inconveniences alluded to above; or, if narrowed, it would fail to answer the purpose for which it is intended: namely, to admit the tongue.* *The width of the port must be, therefore, exactly that of the tongue-channel*—and this is the second grand rule as regards the mouthpiece. Now it has been already shown that the width of the tongue-channel is very constantly three-fourths of the height of the bars, which, being equally constantly 1.8 inches, we have $1\frac{1}{3}$ inches for the maximum width of the port, even in cases where the total width of the mouth, and consequently of the mouthpiece, amounts to $4\frac{3}{4}$ and $5\frac{1}{10}$ English inches: for pony and hack bits, about 1 inch will suffice; whereas the common practice of the bit-makers seems to be to make it one-third of the total width in all cases.

For the height of the port, of course, no rule can be given, this being precisely the most variable dimension of all, and depending altogether, so far as the interior conformation of the mouth is concerned, on the relative thickness of the tongue and sensitiveness of the bars;

* The Germans call the port of a bit the "tongue freedom"—*Zungenfreiheit*—which expresses exactly the purpose for which it is intended.

and further, as we have already shown, on the temperament and general conformation of the animal; finally, too, on the description of service to which it is to be applied; to which must, in some cases, be added the peculiar style of riding or driving of the individual that uses it; for nothing can be more certain than that the best bitting in the world is wholly useless, nay, sometimes dangerous, in bad, that is to say, heavy or rude hands.

Fig. 14 shows a succession of mouthpieces of the forms now generally adopted, beginning with the lightest—that is to say, the one whose pressure is almost entirely exercised on the tongue,—and proceeding onwards with an increase of port or "tongue-freedom"

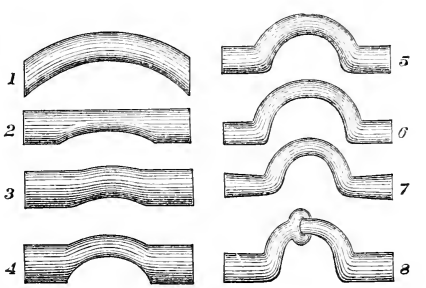


Fig. 14.—Various mouthpieces.

to the very sharpest it is advisable or can ever be necessary to use—namely, to one in which the height of the port is equal to its width, say $1\frac{1}{3}$ inches; and beyond this it is impossible to go, because the slightest pull on the rein would, by altering the position of the lever, bring the top of the port to press against

the palate, causing more or less pain, and therefore inducing the horse to bore with its head in the contrary direction to the pressure—that is, away from the rider's hand.

A mere inspection of these figures shows that the thickness of the iron or steel is an important item; the diameter of the straight portion of the mouthpiece may vary from a half to three-quarters of an inch; and it is scarcely necessary to point out that the greater the diameter the less painful will be its action on the bars of the mouth. When under half an inch it pinches to a certain extent, and should therefore be only employed when one is quite certain that this is desirable. In fig. 14 we have made the width of the port exactly $1\frac{1}{3}$ inches, that of the whole mouthpiece being only 4, which would be rather under the mark. The thickness of the mouthpieces Nos. 1, 2, 3, 4 is three-quarters of an inch, and these range from what is considered to be the very lightest form, No. 1, up to No. 4, which represents a medium bit. We, however, should always prefer No. 2 or No. 3 to No. 1, for the arched form of the latter throws nearly the whole pressure on the tongue, and the very small amount that falls on the bars of the mouth does so *laterally*, and not from front to rear. This form of mouthpiece, too, is always unsteady, and we have seen many horses whose tongues have been nearly cut through by its use with a tight curb. The mouthpieces Nos. 5, 6, 7 are only half an inch thick, which renders their action on the bars of the mouth more telling; they represent sharp bits. It will not escape observation that a greater thickness of the mouthpiece adds, in fact, to the height of the port; it is like placing an arch on higher buttresses, but it renders the

action on the bars less painful, and enables us to meet the exigencies of special cases—as, for instance, where a horse has a thick fleshy tongue and very sensitive bars, and would not bear anything like sharp bitting.

There is another adjustment that may be occasionally employed with advantage, and which naturally finds its place here. The plane of the port is usually made to coincide with that of the whole bit; in other words, if we look at the instrument from either side, the port will be covered by the upper bars; but it is easy to perceive that, by inclining it a little forward, we may increase the tongue-freedom without making the port itself higher; this, however, can only be resorted to with a port of very moderate height; otherwise the roof of the palate would be endangered by every pull on the rein.

Again, we have the well-known contrivance of rings, which prevent horses from seizing the bit between their grinders, and thereby neutralising the lever action, as some will do occasionally; they are also very useful with what are called "dead mouths," and favour the very desirable process of "champing the bit." These rings may also be advantageously applied to the top of the arch of the port, where this, either on account of its absolute height, or its being inclined forwards, is likely to touch the palate. Where rings are employed they must be very movable, and, to insure this, few in number.

We have hitherto considered the mouthpiece as consisting of one piece, but fashion has introduced a great variety of jointed mouthpieces, and these are much used in England. We may classify these mouthpieces generally into such as, having a common snaffle-joint,

are capable of being deflected in every direction; and, on the other hand, such as, having a hinge-joint, can only be deflected backwards and forwards relatively to the plane of the bit. In both cases the deflection affords in its own way a certain amount of tongue-freedom, like the port of an unjointed bit; but here all resemblance between the action of the two ceases; for whilst the pressure, and consequently the action, of the latter is exerted in a direction parallel to the horse's backbone, that of the former, taking a diagonal direction towards the centre, degenerates into a pincer-like gripe, which is wholly unreliable with the snaffle-joint, and more or less so with the hinge one. From the riding-school point of view, jointed bits are altogether objectionable; from the military one, they are scarcely admissible, although the Prussian light cavalry adheres to their use For road-riding and hunting purposes the well-known Pelham is in great favour; and as there must be some ground for this, it is worth while inquiring into.

The great argument in favour of the Pelham is, that the upper pair of reins give you the action of a snaffle—which is, however, not quite correct, but let it pass—whilst the lower pair afford that of a curb-bit, as the expression is. To this latter we must oppose a decided negative, for two reasons: first, because the action that results is that of a pincer, as shown above; and, secondly, because if the dimensions of the upper and lower cheeks of our unjointed bits are very irregular and generally much exaggerated, they are, in the case of the Pelham, simply monstrous, so that the curb is invariably dragged right up out of the chin-groove, and on to the most sensitive part of the under jaw, the effects of

which we have so frequently pointed out. No doubt the Pelham will produce "*painful* action" enough, and so far those whose ideas go no further as regards the unjointed bit are justified in making a comparison; but a painful action exerted in a wrong or even uncertain direction is certainly a mistake.

If we had to address ourselves exclusively to really good and intelligent riders, we would say what they are themselves perfectly aware of, With your steady seat, and light hand resulting therefrom, you have more perfect command over your horses with a well-constructed snaffle than with any Pelham. Your very conviction of this sets you at ease, and that is a great point. If you want a little help with a young horse, here and there, or with one whose neck is turned upside down or the like, you have only to apply the running-rein or a martingal; or, if you prefer it, the same qualities of seat, hand, and *heart* will enable you to put a well-proportioned light unjointed bit into your horse's mouth. But the great majority of riders do not belong to the class we have described above, and having neither the steady seat nor the confidence that arises from it, therefore seek after something more powerful than the common snaffle. Indeed, as a general rule, one finds the bitting severe and the tackle complicated in the inverse proportion of the qualities of the rider; and as to a light hand it is altogether out of the question with people who "stick" on their horses after the fashion of a monkey mounted on a poodle, and derive their chief support from the reins. To such persons we would say, Improve your seat in the first place: until you learn to keep it with ease, altogether independent of the reins, you will be always

looking out for something Pelhamy that will afford you a gripe to hold on by; just the very reason you can't master your horses with a snaffle, and, at a pinch, something with the action of a curb-bit, which you are afraid of, because it affords little or nothing to hold on by. If your judgment were only equal to your pluck, you would soon become independent of these hybrid instruments that pretend to combine the action of snaffle and bit, and, like most other makeshifts, answer neither purpose perfectly and reliably.

We do not, however, mean to say that a Pelham should never be used; as a matter of fancy, fashion, or old habit, many a good rider will cling to it; but then its dimensions should be as carefully adjusted to those of the horse's mouth, and, moreover, to the other peculiarities of the individual animal's build and temper, as we have shown to be necessary with the unjointed bit: and this brings us to another form of jointed bit—that used, as already mentioned, in the Prussian light cavalry (No. 8, fig. 14).

These are very similar to a straight-barred bit with moderate tongue-freedom, but with a snaffle-joint at the top of the port; and their dimensions being in accordance with the size and character of the horses, their is nothing irregular in their action, especially as care is taken to put them into the proper part of the horse's mouth. We consider the unjointed bit to be a better and more perfect instrument, especially in the hands of a good rider; but we must not overlook the fact, that the time of service in the Prussian cavalry being restricted to three years, and, in consequence of the system of recruiting, a considerable number of men being brought into the ranks who have no pre

vious habits of horsemanship, there may be reasons for adopting this jointed bit quite independent of its relative merit.

We would recommend those who, for hunting or racing purposes, wish to have a sufficient command over their horses, combined with a more decided leaning on the bit than is necessary for road-riding or possible for the cavalry soldier, to use what we should be inclined to call a dumpy bit, fig. 15—that is to say, one whose

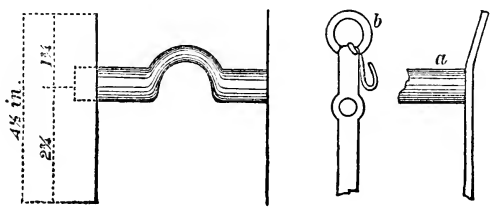


Fig. 15.

upper cheek is exactly of the dimension prescribed above, but whose lower cheek, instead of being double the same, is only about $2\frac{3}{4}$ to 3 instead of $3\frac{1}{2}$ inches long, selecting some one of the mouthpieces, Nos. 2, 3, 4, or 5, fig. 14, that may otherwise suit, and placing it accurately opposite to the chin-groove.* Such a bit would be found much more reliable than one of double the dimensions that is badly placed ; and although some authorities recommend for such purposes an ordinary bit placed a little higher in the mouth than its true place, we have found it better to reduce the dimensions of the lower cheek, as you have *always* a difficulty with the curb if you once depart from the rule.

* A bridoon should be used with this as with every other regular bit.

We have hitherto treated the lower cheek of the bit as a straight line, and this is the form usually adopted in common life; whilst for military purposes various curves are adopted, the best and nicest-looking being nearly in the shape of a capital S. This variety of form, it should be understood, has nothing to do with the action of the bit as a lever: the point of attachment of the lower ring, the centre of the rivet of the mouth-piece, and that of the upper ring or eye, should be in one straight line, and at the same proportional distances from each other, in both cases alike. The real object of the double curve of the lower cheek of the military bit is to prevent the horse from catching hold of it with his lips, and then getting it between his teeth, a trick many horses acquire. With the straight cheek recourse is had to a curb-strap in such cases, as every one knows; but it is much simpler and easier for military purposes to adopt the curved cheek, and there is no other reason beyond whim and fashion why civilians should not do the same.

As to the upper ring or eye into which the headstall of the bridle is fastened, this is now pretty nearly always really ring-shaped. In former times it was usually flattened down in various degrees from an oval to a mere horizontal slit; but since the real principles of bitting have become better understood, the simple ring is preferred, and will be generally found to answer all purposes perfectly, although, no doubt, there are some cases where it might be convenient to use the oval-shaped eye; these are, however, very few indeed. We have also hitherto considered the right and left side pieces (upper and lower cheeks taken together) of the bit as being in all cases parallel to each other, and con-

sequently at right angles to the mouthpiece. There are, however, many horses, especially underbred ones, whose heads will be found to project laterally, immediately above the angles of the mouth, in a sudden instead of the usual gradual manner; and the width of the mouthpiece is therefore insufficient to give the upper cheeks, especially the rings, the requisite degree of play; or rather, the latter will most probably gall the horse's cheeks more or less. There are two ways in which this may be readily avoided; first, by inclining the upper cheeks somewhat outwards (fig. 15, *a*), or by making the upper ring movable (fig. 15, *b*), instead of its forming a continuation of the upper cheek. Either of these methods will be found to answer the desired end, without interfering with the proper action of the bit, and are not only unobjectionable, but should be always resorted to when necessary, because nothing is more common than to see unthinking riders reject a bit whose mouthpiece has the proper dimensions, and adopt one that is a quarter or half an inch too wide, simply because they find that the upper bars do not fit *the outside* of the horse's head; in fact, this is what frequently leads to a wrong selection of bits. People think of the outside and visible part, and neglect altogether the much more important interior of the mouth and the mouthpiece.

It may be useful to summarise here the whole of what has been explained in detail in the preceding pages. We may say, then, that the average height of the bar of the horse's mouth being $1\frac{3}{4}$ inches, the upper cheek of the bit need never be longer, except, perhaps, in very rare instances of horses 18 hands high and upwards; and this gives us $3\frac{1}{2}$ inches for the lower

one, and for both a total of $5\frac{1}{4}$ inches, measured from where the curb-hook rests in the upper ring to where the lower ring plays in its socket. For ponies or small hacks these dimensions must be reduced to $1\frac{1}{2}$ inches upper cheek, 3 inches lower one, and total length of bit $4\frac{1}{2}$ inches. These are the only fixed dimensions that can be safely given; the remaining equally important ones are variable, and must be ascertained by measurement in the way to be presently pointed out.

Let us now suppose that we have ascertained the exact width of the horse's mouth, and also the proper form of the mouthpiece; we then have the length of the curb without hooks equal *once and a quarter* the width of the horse's mouth, and the curb-hooks equal in length three-fourths upper cheek of bit, which will bring the total length of curb *and* hooks up to *once and a half* the same dimension; and it only remains to put the bit and bridle in their proper places.

We have already shown how much depends on the bit being placed accurately. A quarter or even an eighth of an inch higher or lower makes all the difference in the world. The headstall or cheekpieces of the bridle must therefore afford all the necessary facilities in the way of buckles and straps for this purpose. Military bridles and harness have nearly always two pairs of these—that is, one pair by means of which the bit is attached to the checkpiece of the bridle by its upper rings, and a second in the cheekpieces themselves, for the purpose of regulating their length; and both pairs may be employed to determine the height at which the bit is suspended in the horse's mouth. There is a great inconvenience and disadvantage in having a multiplicity of buckles, and many civilian

bridles—if we may use the word—omit altogether the first-named pair, the cheekpieces being then sewed directly into the upper rings of the bit.* This we hold to be a great mistake, because, first of all, the bit, supposing it to be of the proper size and shape, cannot be so easily fixed in its proper place; and, secondly, it is impossible to change it for one that does fit accurately, in the contrary case. In fact, this practice is evidently a consequence of want of clear views on the subject of bitting, and, on the other hand, a great obstacle to the attainment of the necessary accuracy. We hold the lower pair of buckles and straps to be indispensable. The upper pair of buckles might be more easily dispensed with if one single buckle were placed on the top of the horse's head between its ears; for by means of this the total length of the cheekpieces may be regulated *generally*, and the *final* adjustment of the position of the bit accomplished by means of the buckles and straps, which latter should be pierced with holes at intervals of half an inch.† Some people will, however, prefer the buckles in the cheekpieces; and if so, it will be necessary to see that they do not lie higher than the angle of the horse's eye, as they are otherwise likely to interfere with the position of the forehead-band, which should, like every other part of the bridle, including the throat-band, fit loosely, and cause the least possible amount

* We are told "that the gentlemen adopt the latter method and the farmers the former; not having so many bridles, and changing their mouthpieces more frequently."

† It may sometimes be necessary to let the bit down or take it up by a smaller quantity than the half-inch affords: in such cases intermediate holes may be made; but the fewer of these the better, as they weaken the strap.

of discomfort to the horse consistent with the object to be attained.

The noseband has pretty nearly altogether disappeared from our English bridles, which is also a mistake. When horses have been once perfectly trained to the bit, and taken to it kindly, this strap may be dispensed with safely, if people do not like the look of it; but, until this is the case, the noseband is most valuable as a means of preventing the animal from opening its mouth too wide and bolting the bit, or catching hold of it between its teeth—in fact, evading its action in one way or the other. It is very evident that we have by degrees got rid of the noseband because we did not understand its proper use; and, when coupled with the monstrous bits we are in the habit of using, it may have been found sometimes a positive inconvenience; but any one who pays even a slight attention to this matter will find the noseband invaluable in the early stages of bitting. It must, however, be put in the proper place—that is to say, just across the nose at the point where the bone ceases and the cartilage commences; and it should always be buckled so lightly as to admit of a proper amount of free motion.

We may now wind up this chapter with the rules for placing the bit in the horse's mouth. When the headstall has been adapted generally to the animal's head by means of the upper buckle or buckles, the next step will be to adjust the bit by means of the lower ones, so that the mouthpiece shall come to rest on the bars of the mouth *exactly* opposite the chin-groove, unless, indeed, some irregular disposition of the tusks should render this impossible, in which case

it must be moved *only just so much higher* as is absolutely necessary to clear the obstacle. The curb may be then hooked in, first, of course, at the off side, leaving *one* reserve link, then at the near side, leaving *two* such, and taking care that it lies quite flat in the chin-groove, without any even the slightest tendency to *mount* upwards when the reins are drawn. The curb should never be quite tight; there should always be room for the first *and* second fingers of the right hand to pass flat between it and the chin; and by gently pulling the reins with the left hand whilst the two fingers of the right are in this position, it will be easy to ascertain whether any pinching action occurs, in which case there is sure to be something wrong.

As to the measure of the proper length of the curb, we have already stated it *generally*; but each individual case will require a separate adjustment, and if the links be either very large or very small, it will sometimes occur that the difference of one of these will make the curb either too tight or too loose; we must then, of course, try another curb. If the bit is rigid or stands stiff on the reins being drawn gently, the curb will be too short; and on the pressure being increased, the horse will almost certainly either turn his mouth askew to avoid the griping action of the mouthpiece, or bear back suddenly to escape it altogether: we therefore give him another link, and drawing the reins gently as before, we observe whether, after the lower bar has moved through an angle of about eight degrees—bringing the mouthpiece just to meet, as it were, the interior of the mouth—the horse *gives* his head gently and gradually in the direction of your hand as it increases the pressure, without either pok-

ing his nose or shrinking back. If this be the case you are all right; but if the lower bar moves through a much greater angle than the above—say fifteen to twenty degrees—before the horse yields perceptibly, then your curb will be probably too long.

We say probably, because you may, after shortening and lengthening the curb once or twice, find that the horse will avoid the bit in the first case or remain insensible to it in the second—in fact, you discover that the mouthpiece is unsuited; therefore, in adjusting the length of the curb, you must take care to avoid drawing your conclusions too hastily. When you come to a hitch of this kind, lift up the horse's upper lip gently with your left thumb so as to get a view of the interior of his mouth, whilst you draw the reins with the right hand so as to see how the mouthpiece lies, whether too much or too little of its pressure falls on the tongue—in fact, whether the mouthpiece is not in fault; but this requires some experience, and perhaps the help of an instrument, of which we shall have to speak in the next chapter.

And now a word as to the bridoon. This is, in the first place, an aid in the early stages of training to facilitate the transition from the snaffle to the curbed bit; and in proportion as the young horse becomes familiar with the latter it is gradually laid aside, and then becomes a "second string to the bow" in case of any accident happening to the bit or its reins. Nothing is, however, commoner than to see amongst ourselves these its well-understood uses completely reversed, and people riding about our streets and parks holding on like grim death by the bridoon-reins, whilst those belonging to the bit dangle about the horse's neck, to

be caught up all of a sudden if the horse makes a bolt. Now this simply proves that the bit is either so monstrous in itself, or so absurdly placed in the horse's mouth, that the rider is afraid to use it; in many cases, too, his own seat is so unsteady, and he depends so much on the reins for support, that the best-fitting bit in the world would be useless or dangerous in his hands. If those who really can ride would only bit their horses properly, they might take the bit-rein in their hands without any difficulty—nay, with great advantage to themselves,—and we should see fewer broken knees than at present; for it is frequently owing to the slovenly way of shuffling along close to the ground, which horses ridden altogether on the bridoon acquire, that these are owing. As to the other class of would-be riders, it will perhaps be better for them to take to the snaffle exclusively, if they do not prefer a Pelham, which we, however, do not recommend.

The bridoon being, as we have said, an aid, or "a second string to the bow," should never *interfere* with the bit; therefore it should be neither thick nor so absurdly long as it sometimes it; and instead of hanging down in the horse's mouth so as to impede the action of the bit, it should be drawn up so as to fit *lightly* into the angles of the lips without disturbing the natural position of the latter: here it will be out of the way, and still perfectly available when needed.

To conclude, *lightness, accuracy, easy motion, a total absence of stiffness, constraint, or painful action, are the characteristics of good bitting; and if these be attained, ready obedience to the rider's hand and heel will be the result.*

BITS FOR HARNESS.

The same rules are applicable to bits to be used with harness as to those used for saddle-horses. There cannot possibly exist any reason for adopting a different principle than that of making the bit, of whatever kind or pattern it may be, to fit exactly the horse's mouth; and moreover, it should be carefully adjusted to that part of the mouth already pointed out. No doubt somewhat larger-sized bits will be sometimes required, because carriage-horses are frequently larger, and perhaps, too, coarser, in some respects than saddle-horses; but this can never justify the use of the enormous bits that are commonly used. We should doubt very much whether 5 per cent of the horses used in harness in these islands really require bits with cheeks of greater dimensions than those shown in fig. 13, p. 172; that is to say, $1\frac{3}{4}$ inch for the upper, and $3\frac{1}{2}$ inches for the lower part of the cheek, or in all $5\frac{1}{4}$ inches; and we have very little doubt but that at least 90 per cent. of such horses have bits in their mouths that exceed considerably these dimensions—some more, some less; not to speak of the 25 per cent that are tortured with mouthpieces too wide for, or otherwise unsuited to their mouths, and curb-chains that act altogether on the sensitive part of the jawbone.

Fortunately the use of ring-snaffles is becoming more general, and this will in the end lead to lighter bitting. In light draught, and especially where the horses are to be used occasionally under the saddle, a very light Pelham with cheeks not exceeding 5 inches will be found useful. The cheek may be shaped into any fashion

that pleases the eye; the main point being, that it should not exceed the proper length. Another form of bit would be with the mouthpiece, No. 8, fig. 14, p. 183. Those who wish to use unjointed bits may adopt any pattern they please for the cheeks, but the dimensions should be carefully adjusted. Therefore it is an absolute absurdity to make the cheeks so long, that one is obliged to buckle the reins not into the lowest eye or ring, but into one placed higher up. The lower portion of the cheek should never exceed in length exactly the *double* of the upper portion, otherwise the action of the lever becomes too rapid and severe; and even when the billet of the reins is habitually fastened into a ring that is not too far distant from the rivet of the mouthpiece (line of bearing), still the weight of the projecting portion must always affect the leverage of the whole instrument, and nothing is gained by it except being in the fashion.

It would be quite another thing with a bit whose lower cheek was of the proper dimensions, and in *proper proportion* to the upper cheek; to put a second ring or eye for the rein somewhat higher upon the principle of what we have called the dumpy bit, fig. 15, and we should then have the upper portion of the cheek $1\frac{3}{4}$ inch, and the lower portion to the point where the rein is attached $3\frac{1}{2}$ inches long, with an intermediate ring $\frac{3}{4}$ths of an inch higher up; that is to say, at $2\frac{3}{4}$ inches from the line of bearing. This lighter leverage would be then available for young horses when first being trained in harness, or for trained horses when it is desirable to make them throw their weight more into the collar for a long and rapid journey.

A word with regard to the reins for double harness, which may be useful. If the driver sits so that his left hand holding the reins comes to be exactly over the pole of the carriage—that is to say, in its longitudinal axis—then, the outer reins of both horses being of precisely the same length from the point of attachment of the rein to the driver's hand, the two inner or coupling reins should also be made equal in length; but if the driver sits to the right of that central point, as is usually the case, then the outer rein of the near horse will be longer than that of the off horse, and the inner or cross reins must be adjusted so as to give an equal pull on the horses' mouths. The coachman sitting on the hammercloth of a state carriage, and the driver of a London 'bus,' adopt the former arrangement, most other drivers the last-named one; and it is quite plain that a material change of seat will also necessitate an alteration in the adjustment of the reins. For farther remarks on the bridling of horses, see Part IV. of this book.

CHAPTER V.

TAKING MEASURE FOR THE BIT—THE MOUTH-GAUGE—THE TRIAL-BIT.

ALTHOUGH we have given above a certain number of permanent dimensions, or such as are nearly so, for the bit, there still remains a certain number of variable ones which must be ascertained in each individual case—that is to say, the width of the mouth, on which so much depends; that of the tongue-channel, nearly equally important; and finally, the relative thickness of the tongue,—which latter, however, just because it is relative, is not susceptible of direct measurement.

For those who have had much experience in this detail, the width of the mouth, and consequently that of the mouthpiece, may be ascertained with sufficient accuracy by putting any bit that is not too small into the horse's mouth, and, whilst holding it gently *up* to one side of the mouth, measuring off with a small rule divided into inches and eighths or tenths how much of the mouthpiece, if any, protrudes beyond the side of the lips on the other side; if we then deduct this amount from the actual dimensions of the mouthpiece we at once ascertain what those of the bit we seek should be; but it requires some practice to enable one to do this accurately.

Von Weyrother, formerly chief of the school of equitation at Vienna, invented a special instrument for ascertaining *all* the necessary dimensions, and this should be in the hands of all those who have any number of horses to deal with; we have named it, for want of some better word, the "mouth-gauge" (fig. 16, *A*). This instrument is usually made of steel, and con-

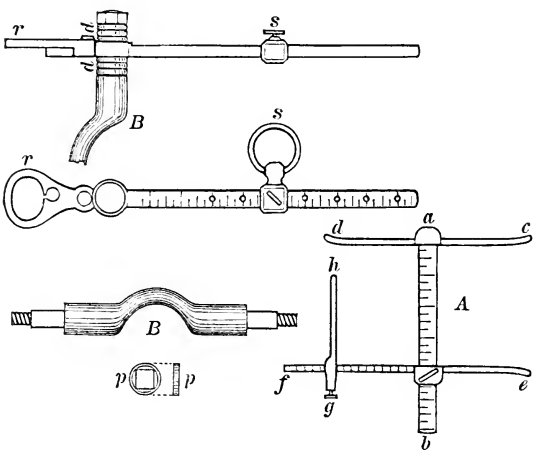


Fig. 16.

sists of a bar *a b*—about six inches long will suffice—fitted on one side at right angles with a fixed cheek-piece *c d*, of the form shown by the figure, and having on the other side a sliding cheek-piece *e f*, of the same shape and dimensions (six inches long), fitted with a screw for fixing it where required. This bar *a b* is made oval in the transverse section, with the greater axis about one inch, in order to displace the lips nearly

as the mouthpiece does, and is usually graduated throughout, but it will evidently suffice to do this with the fourth and fifth inches.

It is scarcely necessary to point out that if this gauge be placed in the horse's mouth like a bit, with the bar *a b* at exactly the proper point (opposite the chin-groove), the fixed cheekpiece *c d* being then held gently up to the off side of the mouth (the operator facing the horse's forehead), the sliding one *e f* may be shoved up just close enough to the cheek, at the near side, not to displace the lips; and then fixing it with the screw, and removing the gauge, we can read off the dimension of the width of our mouthpiece from the scale engraved on *a b*.

The figure shows further a rod *g h* fitted to slide up and down the movable cheekpiece *e f*, which is graduated into inches and eighths or tenths on its lower limb. This contrivance enables us to measure the height of the bar of the mouth, which is done in the following manner: The instrument, adjusted to the proper width of the horse's mouth, is placed as before, with the bar *a b* exactly opposite the chin-groove, but *underneath the tongue*, and is then wheeled round on its own axis till the upper limbs of the cheekpieces stand nearly perpendicular to the general line of the horse's nose. This, of course, brings its lower limbs in the opposite direction towards the neck, and the rod *g h* is then gently shoved up till it presses lightly into the chin-groove, taking care that the gauge stands square, and that the mouthpiece lies equably on both bars of the mouth. The rod *g h* is then screwed fast, whilst the bars of the cheekpiece *e f* is loosened altogether, so that the latter may be removed without

disturbing the rod *g h*; we then read off the height of the bar on the lower limb of *e f*, and have all the necessary dimensions.

It would be quite possible to take another measurement—namely, that of the thickness of the tongue—by placing the bar *a b over* that organ; but it has been already shown that it is its *relative* and not absolute thickness we want to know; and that, moreover, we must take into account the temperament and "build" of the whole animal when we set about determining what degree of relative pressure should be borne by the bars of the mouth and the tongue respectively; so that this proceeding would lead to no useful result.

Even those who have had most experience will sometimes find themselves at fault if they rely merely on measurement; and Lieutenant Klatte, a Prussian instructor in equitation at Berlin, many years ago invented for this very reason what is known as the "trial-bit" (fig. 16, *B*). This affords us at once the means of ascertaining the proper bit for every horse practically. There are a certain number of spare mouth-pieces which may be fixed in succession into the side-pieces of the bit, their width being easily adjusted by means of a number of small plates, *p p*, of one-tenth of an inch thickness, removable at pleasure from the inside to the outside of the side-piece; and having once ascertained the width of the mouth, we may then, having also ascertained the height of the bars of the mouth with the gauge described in a preceding paragraph, proceed to shift the sliding ringpieces *r r* till the upper cheek has attained the prescribed length, after which the curb with its hooks are fitted, and then there only remains to slide the rein-rings *s s* up or

down till the proper proportional length of the lower cheek has been attained. Of course, as we go on from step to step with the adjustment, the straps of the head-stall, and subsequently those of the reins, must be buckled into the respective rings; and when, as a final step, the bridoon has been fitted and the curb hooked, the horse may be mounted and tried.*

In making this trial, those who have hitherto not paid much attention to the subject will do well to take account of the whole circumstances of the case—the temperament, build, &c., of the horse, the uses to which it is to be devoted, and whether it has ever been bitted before or not. If the trial-bit be really well adjusted, and the rider have a good hand, the horse will at once take to the bit, or at least give a promise of doing so, and nothing more will be required than to read off all the dimensions from the trial-bit, in order to have a proper one constructed; if, on the other hand, its action be found unsatisfactory, the lower rings, the mouth-piece, or the upper bar must be shifted till it does suit.

It should be borne in mind that the greatest defect a bit can have is to fall through or capsize—that is to say, describe a large circle before the horse shows itself sensible to the lever action. When this takes place to the extent of the lower cheek forming nearly or altogether a straight line with the rein, there is no lever action whatever, and a good snaffle would be more powerful. This falling through may depend on the curb being too long, or on the upper cheek being absolutely too short, or on the lower one being proportionately too long, especially in cases where the conformation and dimen-

* Mr. Childs, saddler, St. Mary's, High Street, Bedford, has patterns of the trial-bit and mouth-guage.

sions of the mouth absolutely require a very short upper bar, when it may be necessary to make the lower one somewhat less than twice the length of the former, according to the rule we have given; but such cases are few in number, and must be regarded as exceptions —it seemed, however, advisable to mention them.

The next greatest fault is when the bit stands stiff in the horse's mouth; and this will be generally found to proceed from the curb being too tight, or the upper bar being too long, which latter always produces the third fault—the mounting up of the curb out of the chin-groove.

In conclusion, a word as to horses acquiring the trick of getting their tongues over the mouthpiece. This is a great inconvenience, as it renders the action of the whole machine uncertain. There is really no other method of cure except careful bitting and good riding, which may and often does by degrees lessen the evil, if not wholly remedy it; and these means will more frequently succeed with young than with old horses, *for it is almost always a consequence of bad bitting in the first instance.* Our advice would be to ride the horse for a certain time on a snaffle, and then a very carefully fitted bit may be put into its mouth with a fair chance of success; but there are some horses that never forget this trick when once acquired.

There is another trick which is not so inconvenient, although it is very unsightly—namely, when the horse lolls out its tongue either directly in front, or, as more usually happens, to one side. This, too, is usually a consequence of bad, that is, too severe bitting, and, with carriage-horses, of the bearing-rein being too short. In many cases a suitable bit will suffice, combined

with a loose bearing-rein, where that has been the cause, and the horse will be immediately lighter in the hand. Sometimes, however, this fails, and the only remedy that remains is to attach a "fringe" to the mouthpiece, which, hanging down on the tongue, produces a tickling sensation that makes the animal draw back its tongue. However, we should be deceiving our readers in leading them to suppose that all cases are curable; for some horses will persist in this ugly trick despite of everything one can do. Any attempt to tie the tongue in this or the former cases will be found useless and probably dangerous.

Nothing is more certain than that every horse will go much better with a well-fitting bit properly placed than with the contrary; further, that many otherwise dangerous horses become perfectly tractable if properly bitted; and, finally, that inattention to this subject is one of the most frequent causes of restiveness. It, however, by no means follows that every rider should necessarily use a curb-bit. For hunting and racing purposes the snaffle will be generally preferable. Moreover, bad or indifferent riders had better not use the bit at all; but when, from whatever cause, it appears desirable to use one, let it be by all means a well-fitting bit, carefully adapted to the animal.

PART III.

ON DRAUGHT AND HARNESS.

CHAPTER I.

INTRODUCTORY.

It is very remarkable that in this country so large a proportion of very badly arranged teams and horses in single draught should be found working on the same roads with others, and we think the majority, whose whole trim is unexceptionable, and in very many cases perfectly artistic. If the horses and vehicles of the rich all belonged to the latter class and those of the poor to the former, we should feel disposed to lay down the pen at once in despair; but this is by no means the case, the proofs being patent enough that sore shoulders and galled withers are occasioned much more frequently by want of detail knowledge, and attention to simple mechanical principles, than to a deficiency of means. On the continent of Europe, generally speaking, there is much less difference observable in this matter. One seldom sees a very good arrangement of draught and harness, and equally seldom a totally absurd one; perhaps the question of expense has a greater influence in most countries than in our own, and people are therefore driven to make the most of the simple means at their disposal, and ~~et~~ ingenuity supply the lack of hard cash.

The state of the roads, too, varies very considerably in different countries, and this requires corresponding modifications in the details of harness, draught, and the general construction of vehicles. The short traces and pole-chains or straps that suit perfectly a London omnibus or a Viennese fiacre—which, by the way, is an artistic specialty—would be quite unfit and very harassing to horses that have to do their work on roads full of ruts and holes, or at a gallop over hill and dale like artillery-trains. Again, although two-wheeled vehicles do very well and are very handy in a level country like England or parts of Italy, they are quite unfit for hilly districts, and punish the horses very severely and unnecesssarily in going down-hill.

These things are mentioned here for the purpose of showing that our dear old friend and constant guide in practical matters, the highly-respected "rule of thumb," cannot be always depended on implicitly, and is, in fact, by no means an infallible guide; and therefore, as a discerning British public has so favourably received our method of inviting people to find out how things should be done, by pointing out how they should not be done, we shall endeavour to apply the same principle to draught and harness, and proceed to show the why and the wherefore of these matters also.

This subject of draught and harness is one that might be equally well begun upon at either end—that is to say, by taking in the first place *either* the horses *or* the carriage; and this is, in the scientific books, the course usually pursued. But in order to

show that we are not addicted to pedantry, we have determined to begin in the middle, and with what forms the most important link between the two—namely, the trace. And for this reason, more especially with the trace, because the differences in the size of draught-horses and the diameter or heights of wheels require that the traces should be adjusted to certain lengths, and at a certain angle with the horizon. This same angle of traction, as it is called, has been made the subject of many learned controversies, which seem not to have led to any definite result as yet, probably because the men who were directly concerned in the question of draught, and knew *something* about horses, being on the other hand for the most part totally ignorant of mathematics, and prone to restiveness and to wheeling suddenly round and bolting at the very first sight of the *pons asinorum* and other ox-fences that abound in Euclidshire—because these men, we say, went to learned professors who knew a great deal about mathematics, but nothing at all about horses, and very little practically about roads or carriages. If the poor horses themselves could have been consulted, we should probably have arrived long ago at something more definite; and even a moderately intelligent veterinary might have put us on the right track, if he had ever paid attention to the subject otherwise than by attempting to heal raw necks and ulcerated shoulders by methods not uniformly successful. And as we have arrived at this point, and probably wounded the just susceptibilities of no end of people, why should we not go a step farther and suggest to the Society for the Prevention of Cruelty to

Animals that it would attain some of its objects much more certainly by instructing people how they should *not* harness their horses, than by causing poor ignorant wretches to pay sums of money in fines which might be more profitably expended in forage—and this could be easily done. But let us now consider:

CHAPTER II.

THE ANGLE OF TRACTION—THE COLLAR—THE HAMES—THE TRACE—THE POLE AND POLE-CHAINS—THE HEIGHT OF THE WHEEL.

*The angle of Traction.**—The mathematical or mechanical law which informs us that a given force, when applied precisely in the direction in which motion is desired to be effected, confers greater power than when applied under an angle, is so perfectly consonant with our everyday experience that it requires no further demonstration. We may, however, just as well say that as a given force applied directly upwards to a wheel would only tend to lift it up, or directly downwards to press it against or into the ground, so in proportion as it comes to be applied further and further away from either of these two directions—that is to say, the perpendicular line up and down—the more power of rolling the wheel

* The idea of any importance being fairly attributable to an adjustment of the angle of traction has been recently sneered at by some of our "rule of thumb" philosophers, on the ground that the celebrated old coachmen on the Bath, Brighton, and other roads, knew nothing of it. It may be taken for granted that they probably never heard of the existence of such a thing; but that does not prove that they were indifferent to the position of their traces, or unaware of the fact that their teams or single horses required certain adjustments to be made of the harness, the traces and other parts of the harness, and these they did make, not indeed on theoretical grounds, but from personal observation and experience. The sneerers should prove, if they can, that the results of these observations and experiences were at variance with the theory set forth above, which is grounded as all theories should be, on still more extended experiences; by doing so they would extend our knowledge.

forwards would be acquired. In other words, the trace should act horizontally, supposing the wheel to move on a perfectly level and even surface; because the horizontal line lies more remote from the perpendicular than any other, being at right angles with it.

And many good practical authorities who have had much experience tell us the same thing; amongst others, the author of the 'Handy Horse-Book,' who thinks that to make "the draught as easy as possible, the axles [of a carriage] ought to be on a level with the trace-hooks, or point of traction, or as nearly horizontal as possible with the traces and their place in the leg of the hames."*

On the other hand, we have practical authorities who say, "the best disposition of the traces in draught is when they are *perpendicular to the collar;* when the horse stands at ease the traces are then inclined to the *horizon*, at an angle of about 15°; but when he leans forward to draw, the traces should then become nearly *parallel to the road.*"†

Before going further, let us observe here on the modification that the mathematical rule is made to undergo, from the moment you leave the level (horizontal) plane, and get on to inclined planes; for we see that the trace which was at first starting parallel to the horizon becomes *parallel to the road*, and therefore forms less than a right angle with the perpendicular, and this cannot be *prevented by any permanent arrangement of the axles, trace-hooks, &c.* Then, again, this law never contemplates the fact of the horse's shoulders becoming lower—that is, coming

* 'The Handy Horse-Book.' p. 73.

† 'The Artillerist's Manual,' by Major Griffiths. Sixth edition, p. 150.

nearer to the ground—from the moment the animal stretches itself out and lays itself into the collar; and the amount of this lowering will of course vary with the pace, being greatest at full gallop, and also with the amount of effort required.

The French artillery gives the trace an inclination of only 11° with the horizon, and the rule seems to have been deduced from a series of experiments made at Metz by General Berge in 1816, at the time the new system of artillery carriages, copied from the English, was about being introduced.* This officer found that the greatest effort was exercised by all horses—strong, weak, and medium—when the trace was inclined between 10° and 12° with the horizon, or on an average 11°, and this greatest effort exceeded by more than $\frac{1}{9}$ that obtained with the perfectly horizontal trace. Applying a trigonometrical calculation to this fact, it will be found that this angle of 11° corresponds with the supposition of the horse's shoulders being pressed on to the ground by a force equal to $\frac{1}{5}$ the horizontal effort exerted. Following out this indication, General Berge next tried the effect of weighting the shoulders artificially in different proportions, and found that by putting 100 kilogrammes on the horse's shoulders he obtained the same effort under an angle of between 6° and 7° that the unweighted horses gave at 11°; and that weighting with 50 to 60 kilogrammes under the latter angle gave an inferior result to that given by the greater weight (100 kilogrammes) under the lesser angle (6° to 7°).

But all these experiments having been made on a fixed machine, and not on a movable carriage, were

* Migout et Bergery, 'Theorie des Affûts et des Voitures d'Artillerie.'

very restricted in their application, which led the General to make another set on the limber of an ammunition waggon both with and without the instrument previously used.† The results became, however, so contradictory that he was obliged to give up the matter in despair; for not only was the relative power of some of the horses, as previously shown on the fixed machine, completely reversed, but the indications of the instrument did not correspond in any way with the different loads placed on the limber, the only fixed result arrived at being that the effort obtained by a sudden violent plunge into the collar (*coup de collier*) was double that given by the gradually increasing pressure of a steady pull.

Here are discrepancies and contradictions enough both between the practical and scientific men, and also in each group separately. There is, however, in the quotation we have made from the 'Artillerist's Manual,' one sentence that affords a clue to the really important part of the question: we mean the words, "*The best disposition of the traces in draught is when they are perpendicular to the collar.*" For it is quite evident that a horse will apply a greater amount of force to the trace when the collar neither causes him pain nor interferes with his muscular action, than in the contrary case, when every effort becomes painful, and must be exerted in a direction that does not accord with the general mechanism of his frame; therefore a greater useful effect may be attained with traces that are so disposed as to enable the horse to exert his entire strength under a theoretically less favourable angle of traction than when the ease of the animal is

† A Dynamometer.

sacrificed to a correct, but in such a case inapplicable, mathematical principle. In a word, our contention is, that the angle of traction must be regulated with reference to the horse, and not to the carriage *exclusively*.

And by adopting this view, several things that otherwise seemed contradictory and anomalous become at once clear and intelligible; as, for instance, the English artillery adopt an angle of 15°, while the French find 11° to answer better; and why? because on an average the English horses are less straight-shouldered than the French, or indeed than any other draught-horses that we have seen; then again, the results of General Berge's experiments at Metz could not have been otherwise than anomalous, because one horse will draw better under one angle, and another under a different one; and in fact, by overlooking the conformation of the horse's shoulders, while varying the angle of traction, one and the same animal will appear in one experiment relatively stronger, and in a second and third weaker, than another.

The rule of the 'Artillerist's Manual' is therefore so far correct, but it is neither altogether so, nor does it go far enough. For the essential thing is evidently that the trace should be perpendicular to the horse's shoulder-blade, through which the effort is exerted, and whose form cannot be altered, and not to the collar, which may be made of variable thickness; and then again, nothing whatever is said as to the particular part of the collar, and consequently of the underlying shoulder-blade, to which the trace should be attached, which is a matter of the very greatest importance, as we shall now proceed to point out.

Having, we hope, convinced the reader that the horse's convenience being suited is the first thing to

look after, let us examine for a moment which of his members he brings into action in draught, how he uses them, and in what direction the effort is made. Plate I., opposite to the title-page, shows us the shoulder-blade, but it cannot, of course, exhibit the manner in which this bone is attached to the remainder of the framework of the machine, the muscles by which this is affected being mostly hid beneath the bone itself; some, however, are visible in Plate II. (opposite p. 43), as also some others whose function it evidently is to cause, on the one hand, the lower end of the shoulder-blade, which is articulated (jointed) with the arm-bone, to move forwards at each step taken by the horse; whilst, on the other hand, the muscles that descend from the back and withers at the *same time* cause the upper end of this bone to move backwards, so that the shoulder-blade in fact *rotates on its centre, which is fixed*, whilst the upper and lower ends are movable. Every judge of horses knows perfectly well the great value that attaches to a long shoulder-blade, because the longer the arms of the lever above and below the central fixed point or fulcrum, the more powerful will be the action.

Now it seems scarcely necessary to point out that the use of "breast harness," as it is called, which one sees everywhere in the east of Europe except in Russia, or the attachment of the trace so low down on the hames, when a collar is used, as to bring the pull opposite, or nearly so, to the articulation of the shoulder-blade with the arm-bone, is perfectly analogous to a man running a race in a sack, or perhaps, better still, attempting to box with his arms pinioned; but this is precisely what one sees every day, and all day long, in hundreds of instances on our roads and streets—

horses painfully shoving along, at every step they take, the movable articulation of the point of the shoulder against a trace which should be attached *opposite* to the immovable point of the shoulder-blade, where it would not cause the slightest inconvenience, and all this perhaps whilst the driver is congratulating himself on his traces being in the correct angle of traction. Is it not passing strange, too, that the 'Artillerist's Manual,' which gives the admirable rule we have twice quoted at p. 151, should present us, at p. 130, with a drawing of an off-leader, showing the trace attached to the hames exactly opposite to the shoulder-joint? And where is it that horses get most frequently sore necks from the collar? Why, just within a few inches of this very same unlucky spot, either higher up or lower down; or, on the other hand, opposite the other movable end—that is, at the top of the shoulder-blade. We would request our readers to satisfy themselves by inspection as to the rotatory motion of the shoulder-blade alluded to here. It is best seen in foals and young horses, especially mares, and very clearly indeed in donkeys. In old horses, especially those that have been crippled by injudicious harnessing, the whole shoulder stiffens and loses its natural play, so that it is less easy to detect, although it always exists in some degree.

When the trace is attached to the collar very low down, the upper end of the latter will very frequently lose all contact with the upper part of the shoulder, and gape forwards. This, of course, has not escaped observation, and two remedies have been devised, which apparently remedy the fault, but in fact only disguise it; indeed one of them, at least, aggravates instead of curing the real evil. The one remedy consists in

curving backwards the upper part of the collar, which hides the defect partly, and if not carried to the excess of impeding the play of the top of the shoulder-blade, is harmless. The other offers a curious instance of misplaced ingenuity, and is of rather recent date—we mean, the strap led back from near the top of the collar to the trace-buckle, and which converts the front end of the trace practically into a fork, whose points are attached to the hames opposite to the two movable ends of the shoulder-blade, so that in fact the play of this bone is effectually checked *at both ends alternately*.

The fair and inevitable conclusion to be drawn from all this is, of course, that the trace should be attached as nearly as possible opposite to the immovable part of the shoulder-blade—that is to say, to its centre. A very intelligent London harness manufacturer showed the author very recently a number of collars and hames constructed precisely on this principle, and assured him that all the better houses in the trade had adopted it for some time, so that all we can claim here is the credit of showing the why and the wherefore of what ought to be, but unfortunately is not, generally adopted.

The shoulder-blade we may now neglect for a moment, and go on to consider what other members are brought into action, and in what direction the effort is made by a horse leaning up against the collar in draught. Now it is quite evident that in this case the fore legs are much more completely simple bearers, and the hind ones pure propellers, than under the saddle; and turning to fig. 4, p. 41, which was constructed altogether without reference to the question before us, we find that the line *R S* is that in which the propulsion is effected by the hind leg; and now turning again to fig. 1, and imagining a straight line

drawn from the middle point of the anterior edge of the shoulder-blade, where the collar rests, and at right angles to it, we see that this line would, if prolonged, go away to the rear just at the horse's hocks to the point *R*, where it forms only a very small angle with the line *R S* (fig. 4); and it is quite evident that when the horse, in leaning forward to draw, lowers his forehand, the two lines will coincide very nearly; or in other words, the direction in which the propelling force of the hind legs is effected will be exactly contrary to that in which the resistance to the traction occurs, whereas with the horizontal trace it will form a considerable angle with it at the point of attachment to the collar.

We have therefore the weight of evidence, both practical and theoretical, in favour of the trace being attached to the middle of the collar, and at right angles with it: and if this were not so, a horse with a bad, that is to say a short straight shoulder, ought to be better for draught than one with a long slanting one; for the horizontal trace is much more easily attained with the former than with the latter.

In forming a final opinion on this matter of the angle of traction, the fact should never be lost sight of that a high wheel, which always reduces this angle, may, on account of the great mechanical advantages inherent in itself, make a perfectly horizontal trace, or even one inclined the wrong way to the horizon,* appear to be more advantageous than one that works at right angles to the horse's shoulder. This, however,

* As for instance, when a small horse is put into a gig intended for a big one. *Vide* Mr. Pickwick's discourse with the cabman, that ended so disastrously for that gentleman.

is a one-sided view of the case, as the question is, according to our apprehension, not with what kind of machine can we do the work, taking *much* or *little* out of the horse? but, on the contrary, how can we do the work required, *taking the least* out of the animal? We have now perhaps said quite enough about the angle of traction, taken by itself, and proceed to consider

The Collar.—Let us first suppose the collar to fit perfectly, and to lie in such a position with regard to the shoulder-blade that when we talk of a line being parallel to or at a given angle with the one, the same also applies to the other. Moreover, we may confine our remarks at present to one side of the collar, the other side being acted on by precisely similar forces and in the same directions, by which means a balance is established. We may now go back to p. 48 of Part I., beginning to read at the word, "supposing now the under surface of the saddle," continuing through the whole of p. 49, and ending in p. 50 with the words, "a defect that depends on the rider himself." All that is said here of the saddle and the rider's weight applies perfectly to the collar and the pull on the trace, excepting, of course, that in the former case the question is of the effect of gravity, which always acts in one direction, whereas in the latter we have muscular action producing a pull in a direction that may be varied; otherwise, however, the analogy is complete. For as in the saddle injury to the horse's back is best avoided by placing the rider's weight in the centre, so with the collar, injury to the neck and shoulder is best avoided by getting the pull from the middle, and for the same reason in both cases, because the pressure is then distributed over the whole

surface instead of being concentrated on a point. In like manner, as the pressure of the rider's weight on one end of a saddle tilts up the other end and causes it to run forward, so will the pull on one end of the collar cause it to gape away from the horse's neck at the other end, and *grind* up or downwards as the case may be. But the collar is in this respect worse than the saddle, because the rider's weight falls directly downwards for the most part, whereas the pull on the trace may and very often does act altogether obliquely on the collar, and then produces that grinding motion

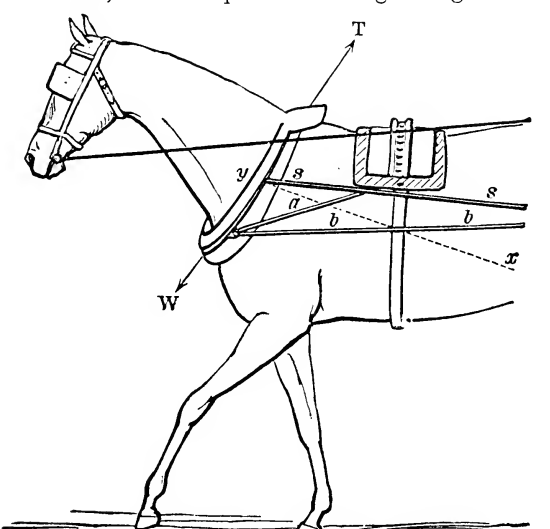


Fig. 17.

which is sure to get up a raw. To have recourse once more to our old familiar illustration : if the pull on the

collar occurs in the direction T, fig. 17, the lower part of the collar is pulled up against the horse's windpipe, and chokes him more or less; and if in the direction W, in which the pole-chains act, then it wounds the withers, and in both cases has a grinding action; therefore the line that lies farthest away from these two objectional directions is the least likely to cause injury, and this is the perpendicular to the collar recommended in the 'Artillerist's Manual,' and is also, as we have seen, the one most nearly parallel to the line of propulsion through the horse's hind legs.

Very injudicious arrangements of the collar and traces occur most frequently perhaps with carts and other two-wheeled vehicles. Having the misfortune to live in a street leading to the coal-wharf of a railway, we have specimens of this sort of thing daily and hourly before our eyes, but the bakers and doctors and fat farmers, reinforced now and then by a few millers and brewers, are also well represented. Like so many other absurdities, this too originates in the exaggerated and therefore wrong application of a really correct and useful principle. There can be no doubt that in two-wheeled carriages or carts the load ought to be balanced on the axle-tree, so as that a minimum of pressure should fall on the horse's back, because by this arrangement the entire power of the animal is reserved for traction; and as the most useful way of employing a horse's power is in draught, and the worst is in carrying a load, the method now universally adopted of taking nearly the whole pressure off the back is quite correct. This is, however, comparatively speaking, a modern idea, for we can well remember the time when such vehicles were loaded very differently, the weight

being thrown to a great extent on the horse's back, under the then prevalent notion that there is a great advantage gained by bringing a horse as *near to his work* as possible. But a great oversight has been committed, or rather a great many of us have forgotten to think at all about the matter, and have gone on using hames and collars that were constructed to be used with shafts that hung in a horizontal position at best, whereas they are now triced up sometimes 1 foot higher at the point, with the same height of wheel, forming an angle of from 10° to 15° with the horizon. This has in innumerable instances inverted the angle of traction, so to say; and the line of the trace, which was intended to be horizontal in accordance with the mathematical theory, now *descends* from its point of attachment on the shaft to the joint of the collar, so that instead of forming a right angle with the collar and shoulder-blade it forms a very acute one with both. No doubt we have thus taken the load off the horse's back, but what we have done with the poor animal's neck and shoulders is shown by fig. 17, which is, we are sorry to say, anything but an exaggeration, or an exception to what daily comes under our observation. This figure scarcely requires an explanation. *s s* represents the shaft tilted up, *a* shows the angle of traction with a short trace, such as is used in carts, and *b b* that of the long one used in gigs; and it is quite evident that, with both one and the other, every effort made by the horse tends to make the collar slip upwards in the direction of the arrow T with the short trace *a* much more decidedly than with the longer one *b b*; and this not only involves a proportionate loss of power, to counteract which the horse is compelled to

bore down still more heavily on his fore legs than would be otherwise necessary, but it also tends directly, from the obliquity of the pressure of the collar on the shoulder, to wrinkle up the skin, and produce injuries. The ill effect of these acute angles becomes still more strikingly apparent when we contrast with them the dotted line *x y*, which represents the position of a trace attached to the centre of the collar and at right angles with it, and therefore lying nearly in the direction in which the effort made by the hind legs is brought to bear on the collar.

This is perhaps the best opportunity for saying a word about the dimensions of the collar, because it is quite clear that if the angle of traction be in a wrong direction either way, and tend to pull the collar upwards or downwards, one might go on indefinitely lengthening it without being ever able to counteract the evil effects on the horse's neck or shoulder. And it is so much the more important to keep this steadily in view, because it is a well-known practical rule that a somewhat too small, especially too tight, collar is much less likely to do serious mischief than one that is too large, especially too long, for it will then slip about from place to place, and wound in all directions.

We now come to the shape of the collar. The great mistake commonly made by harness-makers is, that they think more of producing a symmetrical oval figure that pleases the eye, than of keeping the lines of a horse's neck and shoulders in view; and the consequence is very frequently that the collar is much too narrow at its under part in proportion to what it is somewhat higher up, whereas it should be from 1 to 1½ inch wider at its base than anywhere

else. Fig. 18 shows a front view of a horse's shoulders, and as the collar need never come much lower down than the dotted line *t t*, is is very evident what its shape should be, both internally and externally. The rim, when in process of construction, naturally takes a different and more regularly oval shape, which is probably the reason why failures are so frequent; much can, however, be modified in the stuffing. "Magenta" gives at p. 60 of the 'Handy Horse-Book', a very good model, and places a good reinforcement of stuffing just opposite to the place where, according to our ideas, the trace should be attached. We wind up this part of our subject with the advice, when fitting a collar, not to content one's self with adjusting it to the horse's neck and shoulders when standing. The horse should be put into action; if actually in draught, so much the better, because the shape and dimensions of the neck and shoulders are wonderfully altered in some horses when they come to trot or even walk, especially high-crested animals. A collar that appeared quite long enough for a horse when standing at ease, will frequently

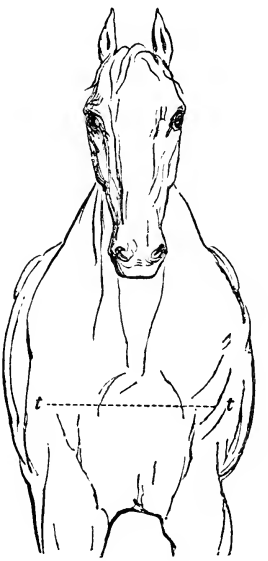


Fig. 18.

prove 2 or 3 inches too short when he is put into a trot.

The Hames.—What we have to say with regard to this important portion of the harness applied chiefly to the mode in which the trace is attached to it. In common cart and waggon harness, the connection is immediate, the trace, whether a chain, a cord, or made of leather, working directly into the draught eye of the hames, fig. 19 *k*, and this is practically superior to any

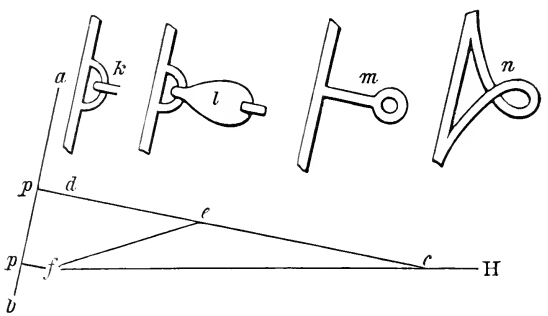


Fig. 19.

other method. But it is open to one objection—namely, that the friction of the trace, as it changes its position up and down, chafes the outer side of the collar and wears it out. In order to obviate this, a great many contrivances have been adopted, as, for instance, an oval plate, fig. 19 *l*; or a bar projecting at right angles to the leg of the hames, and of such a length as to bring the draught-eye clear of the collar, fig. 19 *m*; or, finally, what is called a scroll trace-eye, one variety of which is shown by fig. 19 *n*. Now *l* is unfitted for carriage harness, for which either *m* or some modification

of *n* is almost always adopted. Mathematically, or what is the same thing, mechanically considered, *m* and *n* are identical in their action, for although the scroll may appear to work from two separate points, this is merely apparent, and its action is in reality precisely similar or equivalent to that of the bar *m*.

Our plan being to point out defects, in the first instance, instead of laying down dogmatically how things should be, we would beg of the reader to consider for a moment whether it is not really very remarkable that, whilst the mathematicians and the practical men all insist on the trace being adjusted so as to work horizontally, the constructors of hames should always place the bar *m* or the scroll *n* as if the pull were to be exerted at right angles to the leg of the hames, through this to the collar, and finally to the horse's shoulder blade; and as this latter is never, or at least only in very miserably built horses, quite perpendicular, it follows that the horizontal trace must always act at an angle on the bar *m* or scroll *n*, instead of on the prolongation of their axis, thus converting these contrivances into levers for grinding the collar obliquely into the horse's neck or shoulder, instead of pressing it quite flatly and equably against it. In fact, the hames makers are evidently of our opinion, that the trace should always work at right angles to the shoulder-blade; where they do too often differ from us is, in placing the bar *m*, or scroll *n*, at the lower third instead of in the middle of the leg of the hames. Let *a b*, fig. 19, represent a hames, and *p f*, *p d* the draught-bar, placed, in the former case, near its lower extremity; in the latter, in the centre of the line *a b*. The horizontal long trace *f c* H forms, with the draught-bar at *f*, an

angle, and it would also form one if attached at *d*, *p f* and *p d* being parallel. The short trace *f e* (compare fig. 17 *a*) forms a still greater angle, and the tendency of both must always be to lift the collar upwards, the evil effects of which we have shown. But with the draught-bar in the centre of the leg of the hames, we have both the long and the short traces, *d c* and *d e*, in the line of the bar, and both, therefore, causing a perpendicular pressure of the whole under-surface of the collar on the horse's shoulder.

The Trace.—There remains nothing to be said of the trace, excepting what regards its length. In England horses are harnessed much shorter and nearer to their work than in any other country. Some of the reasons for this are sound and practical, others simply mistakes or misapplied forms of correct general principles. It is in the first place *possible* to use very short traces in this country, because our roads are very generally superior to any others; then it is always *desirable* when the work is to be done on crowded roads or streets with frequent stoppages and sharp turnings. Even for military purposes, where much of the work must be done in difficult ground, there is an advantage in making the teams as short as is otherwise consistent with the ease of the horses, because the length of the columns is thereby kept within limits. But it is altogether a mistake to suppose that a short trace of itself confers a greater mechanical advantage on the motor (horse) than a longer one; in fact, it is very evident that the contrary may be the case, for figs. 19 and 20 show very plainly that the angle of traction may be made more favourable with a long than with a short trace; and what is true with regard to the incli-

nation to the horizon is equally so with regard to a line representing the axis of a carriage. In fact, the well-known advantage of applying force as near as possible to the centre of gravity of the object to be moved depends to so great an extent on the possibility thereby acquired of avoiding waste of power by the force being exerted at a wrong angle or in a wrong direction, that this consideration (the angle or the direction) becomes the principal one.

It is indeed well known to artillery officers that a considerably greater weight per horse may be calculated on for teams of four than for those composed of six, eight, or twelve horses; but this does not depend on the greater distance of the leaders from the carriage, but on the difficulty of getting the increased number of horses to act simultaneously *and* in the proper direction—in proof of which may be mentioned the fact that it is well understood that no real advantage can be attained by harnessing more than ten horses to one carriage, however these may be disposed, and at what distances. It is, then, the angle under which the effort is exercised, much more than the distance of the motor from the load, that requires study and consideration. For instance, no one ever thinks of using in the traction of canal-boats a towing-rope only just long enough to reach the bank. On the contrary, it may be advantageously lengthened till it forms a very small angle with the keel-line of the boat, otherwise there will be great waste of power through the action of the rudder. No doubt the weight of the longer rope must be also taken into consideration; but what an enormous difference there is between the length of a towing-rope and that of an ordinary carriage-trace, and still people will

haggle about inches in the latter. In like manner, in carriage draught the inclination of the traces to the longitudinal axis of the vehicle, which depends to a certain extent on their length, cannot be safely neglected, as a pair of over-fatigued or over-weighted draught-horses point out to us clearly enough by putting their heads together and pulling towards the central line. Let us consider again the case of railways, where we see engines drawing trains of forty waggons, of course not so easily as shorter ones of ten or twenty, on account of the difference of weight, but still without difficulty, because the rails keep the engine and the train mostly on a straight line, whilst in curves the traction becomes always more difficult. If 1 or 2 feet more in a carriage-trace could possibly make such a difference against the horse as is pretended, what must the last waggon of a train that is 100 or 250 yards long do to an engine? Finally, we have lasso harness, in which the single trace is much longer than any used with the collar—8 and 12 feet—and horses that have never been in draught take to this kindly at the very first trial.*

Now we, of course, do not mean to say that short traces are in themselves an impediment to draught; on the contrary, we say that it would be in many respects preferable to use them, if, on the one hand, the construction of the horse, and, on the other, that of our carriages and the mode in which the horse is necessarily attached to them, did not create obstacles that must necessarily be surmounted at the expense of the horse's legs, &c. For, to return to the canal-boat illustration, if the towing-rope be made very short, we have

* See Sir Francis B. Head's 'Horse and its Rider.'

first of all a great loss of power by being compelled to put the rudder hard down to one side in order to counteract the action of the horse on the boat's head, and this of course creates backwater; and then again, we have the horse compelled to exert his strength at a considerable angle to the towing-path on which he works, and instead of progressing straight forwards with his hind feet in the tracks of the fore ones, he is compelled to traverse more or less. By lengthening the towing-rope, both these evils may be diminished, but they can never be altogether got rid of, for which reason there is no kind of work so destructive of horse-flesh as towing boats on large rivers where the current is strong.

Let us now return to the horse drawing a wheeled carriage, and take a two-wheeled one in the first instance. If the two wheels were placed one behind the other, as in a bicycle, one or more horses placed in front in the line of traction might be harnessed each with as short traces as possible. But the wheels being

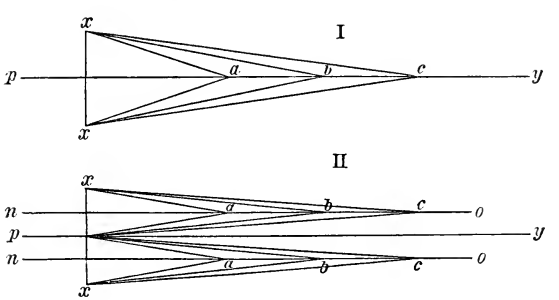


Fig. 20.

placed alongside of each other, the case is very different. Let $x\,x$, fig. 20, I, represent the axle of a gig at right

angles to the line of traction *p a b c*, and supposing the effort of traction to be exerted successively at *a b c*, it is evident that the longer the trace the more nearly will the lines *x a*, *x b*, *x c* correspond with the line o traction *p a*, *b c*, *y*, and therefore the more usefully will the power be employed. Nothing wears or fatigues a horse more than sudden lateral shocks to the collar, the whole weight of which falls on the fore legs; and it is further evident that any obstacle, such as a stone or a rut, impeding one of the wheels, *x*, will give a greater shock to the horse's collar when at *a* than when at *b* or *c*.

The same reasoning applies to a carriage with four wheels, and with two or four horses, as is evident from fig. 20, II, which shows that although the lines *n o*, in which the effort of each horse taken singly is exerted, always remain parallel to the line of traction, *p y*, of the carriage, whatever the length of the trace may be, still the longer trace corresponds more nearly with the line of effort *n o* than does the shorter one.

The result of the whole argument is therefore this: on good well-kept roads that present no lateral obstacles to the wheels, such as stones or ruts, we inflict much less injury on our horses by short harnessing than would otherwise occur; and be it remembered that it is only on such roads, and in flat countries, that two-wheeled draught is at all admissible and generally employed; but we always take more out of the horse than is absolutely required for the traction by so doing, and it therefore is a matter for calculation in each case whether considerations of handiness in sharp turning, compactness, and shortening of the whole

vehicle, and the necessity for making frequent stoppages, or, on the other hand, the wear and tear of the horses, are to be decisive.

The length of the pole and pole-chains.—In four-wheeled vehicles these are important considerations, and so very nearly connected with the length of the traces that they find their place here naturally. As a matter of course, a longer trace involves a longer pole, as the end of the latter should always project to a certain extent beyond the horses' chests. What is this certain length?

In gentlemen's carriages a long piece of pole sticking out in front is considered to be inelegant; then, again, it is supposed to be correct, so to say inevitable, that a carriage should be halted as suddenly as a drill-sergeant halts his awkward squad; and, finally, it is held to be an outrage on all decency and æsthetical propriety if the horses, in endeavouring to "bring up the craft all standing," as the sailors say, and with a mere stump of a pole, should turn out their croupes towards the bystanders. Now, much as we regret placing ourselves in antagonism to fashion, even in the slightest degree, we are compelled to say that the whole proceeding is sadly deficient in that sweetness and light which Mr. Arnold has remarked to be characteristic of the Barbarians; that to us, on the contrary, it is markedly redolent of Phillstinism, inasmuch as it seems to say, "Let us show the Plebians that money is no object, and that one or two pairs of horses, more or less, make no difference."

Fig. 21 shows that when the end of the pole projects but very little beyond the line of the horses' chests—as, for instance, only to the line x x—the animals

must, when suddenly called upon to stop the carriage from a sharp trot, inevitably throw out their croups

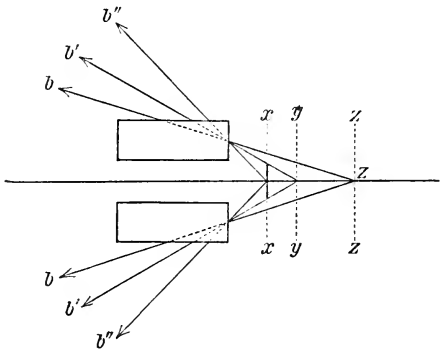


Fig. 21.

in the direction *b″ b″*, which when carried to excess is no doubt very unsightly; whereas by prolonging the pole to the line *y y* they bring them only to *b′ b′*, and if the pole be extended to *z*, then only to *b b*. It is, however, also evident from the figure that by putting a crosstree on the head of a considerably shorter pole—as, for instance, at *x x*—the same useful effect may be produced as with the pole reaching to *y y*. In the end it comes to this—the long pole and pole-chain, like the long trace, would not suit town-work, and therefore a crosstree is, as the 'Handy Horse-Book' says, a very useful contrivance; but by using a somewhat longer pole, moderately long traces, and pole-chains to match, you will for country-work save your horses' fore legs, shoulders, and hocks immensely—for the freer and less hampered a horse goes in draught the less will he suffer, and the longer will he be able to do

his work; although it is, on the other hand, equally true that the shorter and tighter you have him trussed up between the traces and the pole-chains the more you have him in command, but you take a deal more out of him, and wear out his legs sooner. It is, therefore, quite impossible to lay down any general rule in these matters—the manner in which the work must or may be done is the safest guide.

There is, however, one point more to which our attention has been called by a paragraph in a letter received a few days ago from a gentleman whose opinion is of great value, and to whom our best thanks are due; it is this: Very many people find it their convenience to use a horse alternately in *light* draught and under the saddle, but the animal is never so pleasant nor so safe for the latter purpose after having been used for the former. Is this inevitable? and if not, where does the fault lie?—in our method of harnessing or in our mode of training and riding? Let us clear away the ground a little. In the first place, before we endeavour to give an answer to these questions, it must be understood that the horse in question is really fit for the saddle; and, secondly, that it is neither put to very heavy draught nor overworked. Then, again, it will make a great difference whether the work is to be changed daily or at least frequently, or, on the other hand, only at longer intervals. We may say, then, that it is by no means inevitable that a horse should be spoiled for the saddle by having been put into draught, either occasionally or for stated periods; and with regard to the second part of the question, there can be no doubt that the fault lies partly in our method of harnessing, and partly in our mode of training and

riding. Let us take the latter first. It has been shown in Part I. of this book that overweighting a horse's forehand, although it may, under certain circumstances, favour speed, can never conduce to either safety, handiness, or lightness of movement, which are precisely the qualities most desirable in a horse that is to be used under the saddle in the way indicated. On the other hand, the tendency of draught, however light, will be always to make the horse himself throw his weight on his forehand *more* or *less*, and therefore aggravate the effects of our method of training saddle-horses to such an extent that a certain quantity of draught renders it totally unsafe, unhandy, and heavy in its movements under the saddle. The remedy for these evils is neither very obscure nor very difficult of application. On the one hand, it is only necessary to train and ride our horses somewhat more in balance than we are in the habit of doing, which need not interfere much with our national amusements of racing and hunting, because horses are seldom taken out of a gig or waggonette to start them for the Leger or ride to the Quorn hounds; and if we adopt the style of riding recommended here, we shall have in it an antidote, as it were, to that tendency of horses in draught to throw themselves on their forehand *more* or *less*. We have italicised the two comparative degrees of the adjectives of quantity twice, in order to lead on the reader to discover for himself that some considerable aid may be obtained by giving up a system of *harnessing* and *bitting* that tends to make the horses throw themselves *more* on their forehands, and adopting one that will enable them to do their work with greater ease, and at the same time tend to throw them

less on their forelegs; and we feel confident that we have been fully anticipated in what we are now about to say—namely, that, first of all, placing the draught-eye of the hames opposite the horse's shoulder-joint is not the way to give the animal free action under the saddle; secondly, a trace that forms an inverted angle downwards, like *a* or *b*, fig. 17, must make the horse throw himself *more and more* on his forehand; thirdly, trussing up a horse as tightly as possible between short traces and short pole-chains—making it, in fact, a piece of the machine—is not the way to make it handy and light in its action under the saddle; fourthly and lastly, putting an uncouth piece of ironmongery, nearly as big as the front of a kitchen-stove, into the wrong part of a horse's mouth, and with a torturing curb-chain attached to it, will scarcely conduce to lightness in the hand under either a gentleman's or a lady's saddle.

Therefore, ladies and gentlemen, all who wish to keep horses "a double usage," the thing is quite practicable and pleasant, and only requires that the gentleman should sit on the proper part of the horse's back—the ladies do so mostly; that the horses should be properly harnessed and left some room in their traces, instead of being trussed up; and, finally, that the same or nearly the same mouthpiece, whether snaffle or curbed bit, should be used in both cases, always taking care that it fits accurately, and that the curb-chain does not wound the poor chin.*

The height of the wheel.—We began this chapter with an extract from the 'Handy Horse-Book' to the effect that draught would be easiest if the axles of a carriage were placed on a level with the trace-hooks

* See 'Bits for Harness,' p. 198.

or point of traction, the trace itself being also horizontal. This principle, although mathematically correct, requires certain limitations in practice, some of which have been already alluded to. Let us now take a horse of sixteen hands high ; the point of attachment of the trace to the hames could with this sized animal be scarcely brought nearer to the ground than 44 inches, and with a horizontal trace this would involve a fore-wheel of 7 feet 4 inches in diameter, something quite out of the question for carriages, the highest wheel used for field-guns being 5 feet in diameter. It is, therefore, quite impossible to carry out this principle to its fullest extent even with the horizontal trace, which we will admit to be the most favourable for traction *on a perfect level and smooth surface, and putting this slanting direction of the horse's shoulder for the present out of the question.*

But we have already pointed out that when the carriage leaves the level and gets on to an inclined plane, the horizontal trace becomes parallel to the road, and is no longer at right angles with the perpendicular passing through the nave of the wheel, and we shall now proceed to show what happens when the wheel meets an obstacle such as a stone, or gets into a rut, the road being otherwise level. Fig. 22 shows two circles, a smaller and a greater one, representing two wheels of unequal size touching the ground at the point A, and each just in contact with two obstacles N N′ of precisely equal height. In order to enable each wheel to surmount the obstacle before it, a certain amount of power must be applied to the axles O and O′, and this will act respectively on the bent levers O M A′ and O′ M′ A′, and in both cases will be most advantageously applied

in the direction Q and Q′, at right angles to O M and O′ M′. Therefore the horizontal pull on the trace is not in this case, a very common one, the most advantageous, but the contrary. It is, however, evident

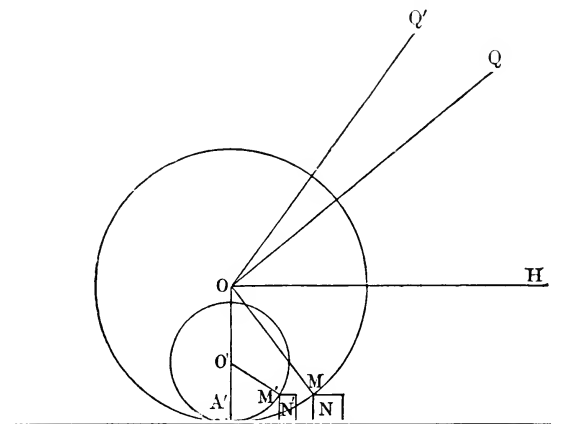


Fig. 22.

that with the larger wheel the most advantageous line of traction O Q lies nearer to the horizontal line O H than does the line of traction O′ Q′ of the smaller wheel, and it is agreed on all hands that the line of traction of a horse attached to a wheeled vehicle must be somewhere near the horizontal line O H, so that this shows that hindrances of a given height are more easily overcome by a larger wheel than by a smaller one, and that in exact proportion to their relative heights. Nevertheless *there must be always an advantage to the motive power when it is exercised somewhere between* O H *and* O Q ; *and as* O H *can, supposing an*

obstacle to exist, never be at right angles to O M, the advantage with a wheel of a given height will always be greater when the line of traction lies nearer O Q than to O H—that is to say, when the traction takes place under an angle with the horizon.

On the other hand, we have seen that with a sixteen-hand horse, a horizontal trace is equivalent to a wheel of 7 feet 4 inches is diameter, a dimension quite unsuited to ordinary purposes ; and although such a wheel would surmount an obstacle of a given height more easily than a 5-foot wheel, there would be a loss of power, or rather an unnecessary expenditure of it demanded from the horse, because the effort could not be made in the direction O Q, and therefore the sixteen hand horse would experience less fatigue when working 5-foot wheels than with the otherwise more powerful 7 foot 4 inch ones, and least of all, of course, when his traces were attached to the middle of the hames, not only because this would bring the line of traction nearer to O Q, but also and mainly because it would suit his own conformation and the mechanism of his movements better.

In order to wind this matter up, let us remind our readers of one more very simple and familiar fact—namely, that plough-horses do all their work under a very considerable angle of traction, and in this case there was no wheel to mislead people with Will-o'-the-Wisp theories, or at least not until lately.

There is one other point in connexion with wheels to which we desire to call attention, because this too is frequently misunderstood. It is said that, with a four-wheeled vehicle, the load should be put as far forward as possible, and that a man placed at the hinder end of

a carriage gives the horses as much work to do as two men placed in front.

Now we have just seen that the lever power of any two wheels in overcoming obstacles—and, except on a railway, there are always obstacles to overcome—is proportionate to their height or diameter; but in most carriages the fore wheels are made of considerably less height than the hind ones for the convenience of turning, the room required being thereby considerably lessened, therefore it is proposed to load the weaker pair of wheels more heavily than the stronger ones. In point of fact, however, the matter would be still worse than this, for the fore wheels, whatever their relative height may be, have always heavier work to do than the hinder ones, for whom they crush obstacles and open smooth tracks—planing the way, as it were, for them. It is, however, altogether unnecessary to go into theory here, as we have abundance of practical experience that this notion is altogether incorrect. In the older systems of Artillery—Gribeauval's for instance, which had 46-inch fore and 62-inch hind wheels—it was considered impracticable to put more than one-half the load on the front axle that the hinder one carried. When, however, the English Artillery, at the beginning of this century, determined on carrying a much greater quantity of ammunition on the limber than had been hitherto done, the fore wheels were made of the same height as the hind ones; but even then, with the old smooth-bore guns, the front wheels were not loaded equally with the hind ones.* It is therefore a mistake

* One of the defects of the modern systems is, that they disarrange the entire balance of the guns and limbers, the gun itself being lighter and the ammunition heavier. In this respect the reverse of progress has been made.

to suppose that four-wheeled vehicles should be loaded in the manner indicated; and if the 12-stone cad of a 'bus took as much out of the horses as the 24-stone driver, why then the breaksman of a railway train of some forty waggons might be considered equivalent to a battalion of the Grenadier Guards in the front carriages, and a break would be almost unnecessary.

CHAPTER III.

TRAINING FOR DRAUGHT.

THERE are in most countries a great number of men to be found perfectly competent to train any, even the most difficult, horses for draught, but their services are seldom available for those who live far away from the great centres of population, and who are constantly obliged to undertake the task themselves, or intrust it to persons who are more or less incompetent. It is to this class, and not to professional coachmen, that we address the following remarks, which do not pretend to being more than hints for avoiding some of the mistakes that so constantly lead to more or less serious accidents, and by which horses are spoiled, not to speak of the danger to human life.

The greatest and most frequent mistake is the undertaking too much at a time with young horses. All of a sudden we not only put a lot of harness on our horse then a bridle and bit of a kind to which he is not accustomed on his head and into his mouth, but also expect him to draw quietly in a vehicle that he has perhaps never seen before. This is all too much at once, and although many horses submit patiently, many others resist, become frightened or infuriated and smash everything, the end being that the animal may be spoiled for draught for ever.

It is much better, and in the end shorter, to begin by putting some portions of the harness on the horse in the stable, and then by degrees the whole. If the animal is once brought to eat his corn with the harness on (excepting of course the bridle), standing quietly in his stall, a great step will have been made. The next thing will be to take him out and walk him quietly about, taking care that the traces do not dangle. Then these may be taken down, lengthened a yard ar two with a piece of rope, and held by an assistant in rear, whilst the trainer takes the reins, and in this way a good notion may be conveyed to the horse of what he will have to do later. It is evident that a perfectly raw remount or young horse should first of all be lounged and trained to a certain extent under the saddle; and the more carefully and completely this has been done, the less trouble will there be afterwards, and the less risk of accident.

It will be found very useful to familiarise a young horse with the vehicle he will have to draw for some days before putting him to it; and when it is practicable, letting him, without being in draught, run alongside of another horse actually in harness is a good way of effecting this object. In Hungary and Poland the peasants often feed their young horses out of their carts for some time before putting them in draught.

So much for the general preliminary treatment; and now for the details with regard to harness, &c. One grand rule is, to put as little harness as possible on your young horse, and let this little be all perfectly strong and serviceable. A trace or strap breaking may spoil everything; and of course the vehicle itself should be in good order, and as noiseless as possible. English

horses will bear almost anything in the way of sounds and smells, but in the east of Europe the horses have an intense dread of raw hides or anything that smells of blood, especially the blood of their own kind,* and it is therefore wise to avoid anything of this sort.

We have already shown how the collar should fit, and where the traces are best attached to the hames; and of course still greater care should be taken to adjust all this properly with a young untrained animal than with an older one that has been already in harness, the great object being always to make the efforts you demand from your horse as painless as possible. Now the young horse comes in contact with two things that distress or annoy him; first of all the collar, and then the bridle, or more properly the bit that is put into his mouth. At first starting, young ones usually make a violent effort, plunging, as it were, into the collar, and then recoiling again to make a new plunge and a new recoil, which sometimes ends in their throwing themselves down, or perhaps running away. Well, what is it they recoil from—the bit or the collar? It certainly is not always, nor even in most cases, the latter; for when the vehicle is pushed from behind by a couple of men, or when another horse is yoked alongside in double harness, so that the collar actually offers no resistance, the same thing will frequently occur.

In the 2nd edition of this book a foot-note was introduced here, recommending the adoption of a drawbar working against a spring for training brakes, and also for gun limbers; with the view of diminishing

* It is very ludicrous to witness the terror and loathing some Hungarian horses experience at the sight of a donkey, especially when he begins to bray.

those sudden checks on the collar which horses dislike so much, and which are so injurious to them. A Mecklenburg engineer named Fehrmann has recently invented a clever contrivance by which this very desirable object of diminishing the injurious effects of the sudden pull on the collar, or what the French call "coups de collier," is to a great extent attained in a very simple and inexpensive manner. In order to understand fully the necessity that exists for some such contrivance, and also to what extent this "horse-saver" of Herr Fehrmann is adapted for the purpose, it will be well to call attention to certain facts connected with draught in general which, although of every-day occurence, are not always duly recognised and estimated. In the first place then we have the fact that it requires a much greater effort on the part of a horse, or team of horses, to put a loaded vehicle in motion from a state of rest, than to maintain it in motion, and this is always greater in proportion to the suddenness with which it is attempted to move it in the first instance. Experiments made with the dynamometer prove that it requires twice or even thrice the effort which suffices to keep a loaded vehicle in motion, to start it; omnibus drivers know this well, and endeavour as much as possible to avoid coming to a regular halt, because the fresh start takes so much out of their horses. The stage-coach horse suffer much less in proportion than the 'bus horse, the stoppages being less frequent. This proportion of two or three to one applies to loaded vehicles moving on ordinary roads, but there is another kind of draught now coming more and more into use, in which the proportion is very much greater and probably as much as five or six to one, namely, tramway draught. In this the rail reduces the effort

required to keep the car rolling to a minimum, whilst that required to set it in motion is nearly as great as on an ordinary road, perhaps quite as great, from the tramcar wheel being so low. In heavy and slow draught horses acquire, after some time, the habit of throwing their weight gradually into the collar, and thus bringing the vehicle by slow degrees into motion and this too is the way in which oxen and buffaloes work, and one of the reasons why these animals can move so much heavier loads than horses can easily deal with. But when horses are required to start a wagon, omnibus, tram-car, or other tolerably heavy vehicle quickly they almost always effect this by making a sort of plunge into the collar, and a large proportion of the effort thus made is expended on straining the harness and carriage and inflicting unnecessary pain on themselves. This desire to endeavour to overcome resistance by a sudden effort is natural to all horses, but is most evident in those that are put into harness for the first time. The young horse, if not properly managed, makes a great plunge into the collar, does not succeed in moving the vehicle, recoils from the pain inflicted on its sensitive neck and shoulders, perhaps too from a sharp bit in its mouth, repeats the process three or four times, becomes disheartened, and is then perhaps cruelly flogged for being sulky. This is the sort of thing too often witnessed.

Fehrmann's "horse-saver," (Pferde Schoner) is intended to remedy this and some other inconveniences that occur in draught. It consists simply of a hollow cylinder of iron about 12 inches long closed at one end by a permanently fixed bottom, through the middle of which a hole is bored sufficiently large to admit the free passage of a $\frac{3}{8}$ inch to $\frac{1}{2}$ inch thick iron rod, the

other end of cylinder has a movable bottom and is fitted with a loop or ring. The interior of the cylinder contains rings of India-rubber, such as are used for gas and steam checks, and thin metal discs perforated in the centre with a $\frac{3}{8}$ in. to $\frac{1}{2}$ inch opening placed alternately, a ring coming next to the fixed bottom of the cylinder and a disc at the other end of the column as it may be termed.

The iron rod, already mentioned, has one of its ends fitted with or shaped like a draught-hook. The rod passes through the hole in the fixed bottom of the cylinder, leaving the hook projecting, and up through the centres of the rings and metal discs resting on the topmost of these latter by means of a key, the whole is completed when the movable bottom is fixed into the cylinder. There is no difficulty in understanding how this contrivance acts. If, for instance, a pair of them be attached by their rings to the draught hooks of a vehicle and by their hooks to the trace of a harnessed horse, the animal will exert its strength against the elastic column of rings and discs inside the cylinder, instead of immediately against the rigid frame of the vehicle. Overcoming the resistance easily at first it does not have recourse to a violent plunge into the collar, and by the time the rod has begun to compress the india-rubber rings into a state of rigidity, the vehicle, if not loaded out of proportion to the number of horses attached, will have began to move, in fact the action will have been brought to resemble the steady push of a draught ox, and will have lost its jerky character to the great comfort of the horse's shoulders, necks, and legs, and to the saving of the harness and carriages.

But it is not alone in saving of power and the diminishing of wear and tear, in starting vehicles from

a state of rest that this instrument can be utilised. There are few roads, however good, on which obstacles to the smooth running of the wheels of vehicles are not encountered in the shape of ruts and stones, either loose or embedded in, but projecting more or less from, the surface. Whenever a wheel comes in contact with one of these its progress is checked, more or less, according to the depth or height of the rut or stone, and this check is forthwith propagated to the collar, causing a proportionate amount of pain and fatigue by the sudden wrench it gives to the horse's neck and legs, and this may be to a great extent avoided by the use of the horse-saver.

That these savings of power and fatigue may be really effected is matter not of mere theory, but of actual practical illustration. Careful experiments have been instituted and carried out by several public bodies interested in these matters in Germany and elsewhere. The Imperial General Direction of Posts at Berlin, made one series of experiments, the result of which was a strong recommodation to its subordinate Posting establishments to introduce this instrument. It has been tried successfully by the Swiss Artillery, and the Royal Veterinary Schools at Berlin and Munich have reported that a very considerable amount of saving of fatigue to the horses is attained by its use, and that it prevents the development of certain morbid formations on the horse's limbs, etc., to such an extent that a three years' longer period of service may be expected from them. And, what is of great value in training horses to draught, it has been found that the animal seems to be encouraged to exert its strength from finding that an immediate result follows its first effort.

A well-arranged series of experiments instituted with the horse-saver, by the section of the Agricultural Institute of Halle, devoted to the trial of machinery, shows that Fehrmann's traction springs or horse-savers, afford an increase of tractional power of the horse, amounting to from 18 to 20 per cent.; a diminution of the shock transmitted to the legs and breast of 22 to 33 per cent., and of wear and tear of vehicle and harness of the same amount. These experiments were made on pavement, on steep hills, over ploughed land, and both in trot and at a walk, so that they seem very reliable. The author has not himself had any personal experience on the subject, but the authority on which the above statements are made being official and perfectly independent deserves credence.

The horse-saver is manufactured in several forms adapted to various purposes, as for instance a single one may be made to suffice for the swinging bars used for a pair of horses, or two may be employed for the same, one being attached behind each of the smaller bars, or as has been already pointed out, one may be attached to each trace. There is also a modification applicable to the fixed splinter-bar of private carriages. The strength of these instruments varies, some being applicable for loads under 30 cwt., and others for loads from 50 cwt. up to five tons.*

It is well known that the use of springs diminishes very considerably the amount of traction required, although of course the weight of the vehicle is increased, the reason being that the cheeks to the collar

* The inventor and patentee, Mr. C. L. Fehrmann, manufactures the various kinds of Horse Saver at Berlin, No. 27, Oranienburger Street. They may also be had from A. Lace, Agricultural Implement Maker and Commission Agent, Chisbury, Gt. Bedwyn, Hungerford, Berks.

arising from the inequalities of the ground, are greatly diminished. This horse-saver has precisely the same effect and there seems to be no doubt, that by the use of both combined the work of the horse can be done with a minimum of inconvenience, and that where springs can not be used, as in very heavy waggons, the horse-saver will go far to supply the want of them.

There is some difficulty about the bitting, as it is scarcely safe to trust to a very light bit with a young horse the first time in harness, and anything that acts very sharply or even decidedly is very likely to make the animal *appear to refuse the collar*, when in reality it is the bit he is afraid of. This proves how very important it is, not only to pay great attention to the bitting of draught-horses—making it under the saddle as painless as possible—but also to accustom them to the action of the bit they are to be driven in *before putting* them into harness; and we fear that all this is very much neglected, or very clumsily attempted.

Shortly after the appearance of the first edition of this book the author received a very polite letter, inquiring whether Seeger's running-reins could not be used with harness, and especially for training young horses. This is a very valuable suggestion, and appears to afford a remedy for the difficulty we have just been debating. In fact, by using a training-halter and the running-reins combined, we can put a common snaffle into a young horse's mouth without incurring the least risk of his running away, as the halter prevents the animal opening his jaws and getting the snaffle on to his tongue, whilst the running-reins afford a perfect command over the head. When, therefore, the young horse makes his first plunge into the collar, the driver may give him his head safely; and the

probability is that there will be no recoil, or at least that it will be then quite clear where the difficulty lies, and therefore the remedy easier to find. In a subsequent letter the writer of that letter mentions having tried the running-rein successfully, but he does not say anything of the training-halter, which we consider to be of equal importance. An Irish friend of ours has also tried it successfully in single draught. Not having had an opportunity of trying this arrangement ourselves—for it is altogether our correspondent's idea—we cannot say positively that it must succeed; but we have not the slightest doubt of its being a very valuable aid in training young horses to draught.

The running-rein can be very easily lengthened by buckling on a piece of rein to it, and when there is a hame-martingal strap, an ivory ring attached to this *above* the ring for the pole-straps (or chains) and the leather curb carrying the smaller ring under the horse's chin will be all that is required. For double harness, and when used for both horses, the ends of the running-rein might be led through the inner terrets of each, and come into the driver's hand like the leader's reins in four-hand draught, for it is only for riding that it is more convenient to bring the end of the rein to the right or off side. In case of necessity, the driver could then with his whip-hand bring his team up most effectually. For ladies or invalids driving spirited horses or ponies, the two running-reins might be buckled into one leading-rein and fixed to the dash-board or elsewhere, so as to be easily within reach.

In any case it is advisable to bit horses so that they may take a firm leaning on the hand in the first in-

stance, and then by degrees the bitting can be altered to suit *all the circumstances* both of the animal and the driver. Thus one might begin with a snaffle in the manner indicated above, then go on to a light jointed bit of some kind with a curb, and end perhaps with an unjointed one.

Another mistake frequently committed is the putting an untrained horse to a vehicle in some narrow court or yard, which necessitates perhaps a sharp turning immediately after starting. This should be avoided, and the start made, if possible, on a straight line and on a quiet road, for which reason early morning is the best time for this sort of work.

Then again it is a mistake to take a young horse out too far the first time; and it is advisable, when practicable, to make a round home, and not return by the same road you went out. It is wonderful how soon and easily horses contract habits, which become very troublesome afterwards; therefore in training a young horse one must avoid anything like a routine that is easily mistaken by the animal for a part of its regular duty. One or two quiet steady assistants are indispensable, and they should be instructed what to do beforehand; the less talk and noise made the better; and the groom, or whoever feeds and tends the animal, should always be near its head at first; his voice always should inspire confidence, and always does so, unless he is in the habit of ill-using his charge, which is not a frequent occurrence. At first starting, or whenever a hitch occurs, this man should be immediately at the horse's head, ready to pat its neck and give it a good word. Sometimes, when one is obliged to train raw young horses quickly, a cavesson with a man holding the

lounge-line* on each side should be resorted to, for which reason it is, as has been already observed, very important to make horses handy on the lounge, previously to putting them in harness at all.

At first the trainer will do well to avoid all attempts at turning with the reins alone, and will prefer working as much as possible on straight lines and on the level. If a turning be unavoidable, the assistant goes to the animal's head, and if necessary, "leads" in the required direction; and if an ascent must be mounted, assistance should be given from behind by shoving the vehicle. By carefully avoiding all occasions for misunderstanding during the first two or three days, very rapid progress may be generally made; whereas by being in too great a hurry, or exhibiting too much energy at the wrong time and place, much mischief may be done and a deal of time lost.

When your horse or horses draw willingly on the straight road you may begin to make them handy in turning, in halting, standing patiently for a time and then starting quietly again. A large square or courtyard is the best place to practise this part of the work, driving along the sides and rounding off the corners well to commence with, then changing hands on the diagonal and ending with a figure of 8. It is nice, pleasant, and not altogther unintellectual work, to bring a pair of young horses to trotting equally and to keeping regular time in all these turnings, sometimes increasing sometimes slackening the pace, then halting to breathe themselves, and then starting again for a

* This word "lounge" is evidently a corruption of the French *longe*, from *allonger*, as "cavesson" is of the German *kapp zaum*, derived from Spanish *cabeza*, the head.

new spell. The horses seem to like it themselves, and to understand perfectly its object.

There are two parts of the harness which may, if carelessly or awkwardly used, prove serious obstacles to the training of a young horse—one of these is the crupper, the other the bearing-rein. This latter should be laid aside altogether with young horses at the first trial; if judiciously used, subsequently it may be of good service in getting the horse's head into the proper position, and making it light in the hand by dividing the pressure over two mouthpieces instead of one; and this is its legitimate use, and not, as too often happens, the tying up the head and neck till the horse's action is more up and down than forwards. Short-necked horses with ill-set-on heads are those that require most caution in the use of the bearing-rein, and these are precisely the sort of animals that one is naturally tempted to try it on.

Since the above appeared in the 2nd edition of this book, we have had a great "bearing-rein total abolition movement," which at one time threatened to assume the most formidable dimensions, and, at all events, attained the dignity of being submitted, at least once, to the presiding magistrate of a London police court for his supreme decision. This seems to be a case of what the Germans call "emptying out the child with the water of the bath." It would be quite as reasonable to ordain that, because tall hats are ugly and uncomfortable we should all of us go about like the boys of Christ's Hospital; or that because extravagantly high-heeled boots produce corns and render graceful movements an almost impossibility, ladies should be compelled to walk barefooted, as to maintain that—because

some people are silly or prejudiced enough to admire a ridiculous and extravagant position of their carriage horses' heads or an overdone so-called lofty action,—bearing-reins should therefore be altogether abolished. The abuse of the bearing-rein, as seen mostly in town equipages, is simply the product of that very questionable kind of taste that goes in for what is lofty and imposing at the expense or in defiance of every other consideration. That it is by no means a necessity for town traffic will become quite evident to those who take the trouble to observe the dexterity, one might almost say grace and elegance, with which most of our well horsed Hansom are steered through the most crowded thoroughfares, the bearing-rein lying quite loose on the horses' neck, and this too with nothing more powerful than a ring snaffle in the animals' mouths. It all depends on the hand of the driver, and there lies the difficulty.

All this may be at once conceded to the abolitionists, but the bearing-rein has, nevertheless, very distinct and important uses, and it would be sheer folly to deprive ourselves of so valuable an adjunct to harness because it is in some instances abused. We have now-a-days a goodly number of lady drivers, and to them especially the bearing-rein is, if properly applied, of very great importance. Ladies have frequently quite as much courage and judgment in the management of horses as men, sometimes even more of the latter, and they have almost invariably a lighter hand and consequently a more delicate touch. Whenever these two qualities are in default, their loss may be generally traced to want of power, the team pulls too hard or bores too heavily for the ladies' muscular powers to withstand and rigidity ensues. Recourse is

then had to sharper bitting, which although sometimes successful is much more frequently the reverse and very often leads to fresh complications; whereas a judicious use of the bearing-rein would solve the difficulty at once.

Why the bearing-rein should have such an effect will be easily recognised by anyone who will take the trouble and has the opportunity of observing how horses when left to themselves modify their carriage, especially that of the head and neck, to suit the speed and changes of direction of their movements. If a tolerably fresh horse be turned loose in a field, especially one in which other strange horses are present, it will be seen, in most instances, after a few cautious movements with the neck erect and its weight thrown well back on its haunches, in the attitude of preparation for any emergency, suddenly to bolt off with the head and neck brought down more and more as it extends itself and increases its pace, whilst reconnoitring the ground and its new companions in a wide circle round them. And this is precisely what a frightened horse will do in harness unless checked by the bearing-rein, which if of a proper length will prevent the animal from laying itself out with extended head and neck and throwing all its weight on the fore legs, which of course leaves the hind pair their maximum power of propulsion.

Of course, if teams have to travel at the top of their speed, as in the old coaching-days for instance, the bearing-reins must be slackened or cast loose altogether, as we have often seen done by the nimble guard in days long past.

In like manner as the spontaneous movements and

changes of attitude of the healthy horse point out to us what may be attained by a judicious use of the bearing-reins, so also we may learn something from the observation of the self-adjustments which an animal with weak or diseased limbs puts in practice to ease itself. A horse that suffers in the fore legs will, so far as he can, throw his weight back towards the hinder ones. If only one fore leg is affected the hinder one of the opposite side will be made to help out its fellow more than that on the same side, and this often helps one to find out where the mischief really lies. On the other hand, if the hind legs are the sufferers, or one of them, the animal throws its weight on the fore legs, hanging down its head and neck, more or less in the proportion to the degree of suffering it endures. Here then we have indications sufficient for our guidance in the use of the bearing-rein. An animal may be weak in the hind quarters, or perhaps merely in the legs, this will induce it habitually to throw its might forwards, and it will bore in the hand of the driver, who in such a case must be very careful not to bear up the head too much or too persistently. Or a horse may be tender on the fore legs, whether from work, bad shoeing, or some other cause; when a judicious use of the rein will second its spontaneous efforts to assume and maintain such a carriage as best suits its build or perhaps infirmities.

Of course it is not meant that horses really unfit for work, should be compelled to do it after the fashion of Mr. Pickwick's cabman, who preferred to think that if they were "well" bore up and had a pair of good high wheels behind them they must go"—or something to that effect; for the quotation is from memory. What

is meant to be said, is, that the bearing-rein is a very useful part of the harness for many ladies, and also gentlemen, who are not professed coachmen, and even for the latter with certain horses, and that it should not be sacrificed either to outbreaks of spurious sentiment or a desire for notoriety.

The crupper is still more dangerous, being by far the most usual primary incitement to kicking in harness. Under the saddle this bad habit is unpleasant enough, but in harness it is quite intolerable and most dangerous. The writer has quite recently had some painful experience of the danger of trusting to the crupper in harness, or even using it at all with mares, especially such as have once had foals ; his own and the carriage of a lady friend were kicked to pieces by two such mares, although there was a breeching in each case. Without the crupper, even after the accidents had occurred, both mares went perfectly quietly. It may be said, that it is not necessary to abandon the crupper totally, on account of some exceptional cases like those just mentioned. The reply is : Why retain it if it can be safely dispensed with ? One of the most obvious uses of this part of the harness is that it affords a sort of counter-check for the bearing-rein. Now one of the uses of the latter to which allusion has not been made, is in the case of kickers to get their heads and necks well up, for by this means they are prevented from throwing their weight on their forehand, which a horse must do in order to get his hind legs perfectly free for kicking. Unfortunately, the kicker is pretty sure to resent the crupper, and the cure of the bearing-rein becomes a provocative to further bad behaviour, the horse bolting, or throwing itself

down, etc. There is really no good reason why the harness saddle or territ-pad should not be so constructed as to keep its place sufficiently well as to afford a counter-check for the bearing-rein when used moderately, if only the girth be sufficiently tightened, to which there can be no more objection than with a riding saddle. Therefore so far as the bearing-rein is concerned the crupper may be well dispensed with.

Let us now enquire what can be done, to render all reliance on the crupper, as a means of arresting the progress of a vehicle, superfluous. Four-wheeled carriages with poles come first for consideration. Here the vehicle is prevented from running forward too rapidly, or brought to a standstill altogether by the action of the pole-chains through the collars on the horses' necks, unless a skid or brake be employed in addition, of which more hereafter. One seldom, if ever, sees 'Buss' horses afflicted with cruppers. Four-wheeled carriages with shafts demand special notice, including as they do the many varieties of pony carriages, so extensively used in this country and very frequently driven by ladies. There can be no doubt that the harness used for such vehicles should always be furnished with a breeching which, when combined with a kicking strap, may be made very neat to look at, and renders the crupper quite unnecessary. The great question to be determined is whether it should be what is called a short or a long breeching, that is to say, whether it is to act directly on the shafts or to be carried forward so as to act on the tugs, when it is called a long breeching. In most vehicles of this description the front carriage is made very low for convenience of turning, and the shafts are consequently more or less inclined to the horizon, according

to the height of the animal used. The consequence is, that, if the front wheels be very low and the horse or pony a little tall in proportion, the short breeching acts downwards, not horizontally as it should, the pressure on the animal's hind quarters becomes then very annoying to it, ending not unfrequently in a kicking match, besides which the carriage is not effectually held back.

Reviewing the whole matter one can scarcely avoid arriving at the conclusion, that although a great number of horses willingly endure the crupper, a great many others, especially mares and young animals, will not do so, and with them it becomes an incitement to vice of one kind or the other, either in the stable or in draught, many accidents occurring in consequence, and finally that it may be very well dispensed with in all cases.

Connected with this subject is another matter which may as well be treated of here; namely, the use of other contrivances, besides the breeching and the pole-chains, for moderating the movement of a carriage. In former times we had in the British islands nothing but a skid or shoe, which was placed under one wheel, and to attach or detach this the vehicle had to be halted in every case. On the Continent various contrivances were in use analogous to the brakes now used for railway waggons and trucks, which admit of the moderating power being applied or removed whilst the vehicle is in motion, and one now frequently sees, especially in hilly districts and in general for country work, various forms of brake applied to pony carriages, 4-wheeled dog-carts, and other vehicles. There are one or two little difficulties about these brakes which may be easily

remedied or avoided. First of all, the pieces of wood, which are brought into contact with the tire of the wheel are usually made fast to the arm of the

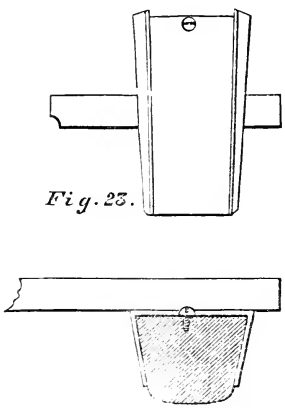


Fig. 23.

brake by means of bolts whose heads are counter, sunk, as the technical term says, into the piece of wood. But after a very short time the wood is worn away and the head of the bolt coming into immediate contact with the tire of the wheel is not only in its turn rapidly worn away and requires to be replaced, but also makes a very unpleasant grating noise which, when the brake is applied, is apt to startle the horse and make it increase its pace just at the moment one wants the vehicle to go slowly down hill. To remedy this, to a great extent at least, it is only necessary to give the pieces of iron that carry the little blocks, which rub against the tire, what are called flanges, making these pieces also somewhat wider at one end than at the other. The

blocks will then, on being fitted in, have a wedge shape and will be kept in their proper place by the friction against the tire, but it will be better to fasten them in at the back by means of a wood-screw, for if the brake be applied *behind* the wheels the small end of the wedge coming at top, it would be liable to fall out. See figure 23.

The other difficulty arises from the power by which the break is applied being frequently made to act not in the centre of the brake bar, but at or near one end of it. The consequence is, that the other end not being equally braced up, jerks and makes a clapping noise which frightens the horse. The power should therefore be applied as nearly in the centre of the bar as possible, and this should act on the tire of the wheel on a level with the axle-tree as most coachmakers know. The brake is a great help when one has to deal with a horse or pony given to bolting or running away, but it should for this very reason be made to act as noiselessly as possible. Perfectly noiseless it can scarcely be made, and we should therefore accustom the horse to its use on level ground in the first instance. Whenever one can it is, of course, best to begin the training of young horses in four-wheeled carriages; if fitted with a brake so much the better, and best of all when this can be done alongside a steady trained horse.

Restiveness and insubordination in draught are not easily dealt with, and are perhaps, still more dangerous than under the saddle. The general principles on which these are best combated will be found in Part IV., which treats especially this part of our subject. It

will be seldom safe for a gentleman driver to undertake the correction of restive horses himself—he will do much better to leave this in the hands of professional people; but any one can avoid making things worse than they are by simply laying it down as a rule to investigate quietly the causes that have led directly to the first overt act of rebellion or violence before going further, especially before attempting severe treatment. In very many cases it will be found that there is something wrong with the harness or the bitting or the carriage. Want of consideration in demanding either too much, or something the horse does not understand, are frequently causes of apparent restiveness.

But having now pointed out the most usual mistakes made, and also shown how they may be best avoided, we take leave of this subject.

PART IV.

RESTIVENESS: ITS PREVENTION AND CURE.

CHAPTER I.

HOW TO RENDER HORSES OBEDIENT.

THERE exist, no doubt, many horses that deserve the epithet vicious, in the proper signification of the term; they are, however, by no means so numerous in proportion as many people suppose, and it is of great practical importance that simple restiveness or disobedience should not be confounded with the peculiar temperament or disposition which constitutes a truly vicious horse. Such an animal's temper can scarcely be changed, although it may be dominated by force,—as, for instance, by Mr. Rarey's method, which, by the way, was known to and practised by Major Balassa, of the Austrian cavalry, forty years ago; but the overawed and subdued brute is not thereby rendered a useful and docile servant, nor is any clue afforded us for overcoming special forms of restiveness or insubordination we may have to deal with: and so the horse-tamer, after attracting an undue share of public attention for a moment, finds himself in the end neglected and forgotten.

There is, too, a danger in all these methods—namely the natural tendency they have to induce riders to rely on forcible measures in all cases, the result of which is but too frequently to convert a simply restive horse

into a decidedly vicious one, by awakening the devil that slumbers within. *For it must never be forgotten that in the end the horse is stronger than the man; that there is very great danger of this becoming quite clear to the former, when mere force comes to be opposed to force; and that this very consciousness is what constitutes restiveness, and, if exasperated by cruel treatment, vice, pure and simple.*

It is therefore necessary, in the first place, to know clearly what one has to contend with—whether with real vice, or merely with simple insubordination: the former, if curable at all, can only be dealt with successfully by professional riders, who possess the proper means and appliances; the latter ought to be within the scope of a great number of horsemen, if they would only abstain from violence and adopt rational methods. The French say, when speaking of a horse that shows restiveness, "il se defend"—he defends himself. There is much truth in this expression, and it is one that riders should constantly bear in mind, for insubordination is most commonly the result of something having been demanded from the horse that it either did not know how to do or was unable to perform; and the very first step to be taken in all cases is, to endeavour to ascertain exactly under what circumstances the disobedience was first manifested and is usually shown.

Before we affix the stigma of vice to a horse, let us therefore consider for a moment what the poor thing might with fairness retort, and the words ignorance, timidity, or brutality will immediately suggest themselves; for, in truth, want of judgment as to what a horse can fairly do, want of decision and promptitude in demanding this, or unnecessary violence in enfor-

cing a demand, especially an unreasonable one, are almost always the first causes of restiveness. Mankind in its arrogance has thought fit to make the ass an emblem of stupidity, and why? Is it not because it seldom if ever opposes anything more than passive resistance to the tyranny of its oppressors? it wants the strength and the active courage that would enable it to act aggressively and deserve the title of vicious enjoyed by its near relative the zebra, whose indocility is not considered to be stupidity. We doubt much whether the horse is really more intelligent than the ass; it has greater strength and agility, and a more active courage, which, if it knew how to use, would enable it to set mankind at defiance equally as well as the zebra; and it argues a certain amount of stupidity when so powerful an animal suffers itself to be converted, as it often is, into the abject slave of a miserable taskmaster. The intelligence of the horse is, however, sufficient to enable it to find out very soon whether its rider be or be not deficient in that self-same quality, or in courage; and in the former case, the consciousness of superior strength encourages it to use this "il se defend"—that is to say, it sets the rider at defiance and turns restive.

There is another thing to be considered with regard to the horse's character—it loves to exercise its powers, and it possesses a great spirit of emulation; it likes variety of scene and amusement; and under a rider that understands how to indulge it in all this without overtaxing its powers, will work willingly to the last gasp, which is what entitles it to the name of a noble and generous animal. Now, whilst over-exertion, when unfit, will very frequently make horses refuse work,

on the other hand, deficiency of exercise, and constantly riding the same dull round either alone or in company with other horses, will give rise to a whole string of evils; as, for instance, refusing to go any but a certain way, or to leave their stable, or clinging to other horses they meet with, &c.; and this is just the reason why so many cases of restiveness may be traced to the stupidity or pig-headedness of a groom. Horses don't like to be *ennuyé*, and will rather stick at home than go out to be bored; they like amusement, variety and society: give them their share of these, but never in a pedantic way, and avoid getting into a groove of any kind, either as to time or place, especially with young animals. It is evident that all these things must be taken into account and receive due attention, whether it be our object to prevent or to get rid of some bad habit a horse may have acquired; and a little reflection will generally suffice to point out the means of remedying something that, if left to itself, would grow into a confirmed habit, or if attacked with the energy of folly and violence, would suddenly culminate in the grand catastrophe of restiveness.

The method according to which a restive horse has been originally handled must be also taken into consideration before one can form a sound judgment as to the best method of cure, as it makes an immense difference in this respect whether the animal has been treated on the English plan of merely gradually "habituating" it to go in the manner desired, and leaving it very much to its own will and pleasure to do so, or whether the Continental mode has been adopted of endeavouring to obtain, by more stringent and systematic means, a perfect mastery over its movements

in the first place. Each of these methods has its own peculiar advantages, and, as regards the prevention and cure of restiveness, disadvantages also. The English plan is, no doubt, much less likely than the other to lead directly to conflicts, simply because it avoids them, but it does not afford that degree of control over the horse's movements that is indispensable for combating insubordination successfully; and if the horse does slip into bad habits, the temptation to use violent measures, which sometimes succeed, but as frequently drive things to extremities, is very pressing. In such cases there is no other remedy than to commence the handling *de novo*, which is a very troublesome and not always successful operation, especially in the case of aged horses, for such resist and very frequently resent every attempt to gain that perfect command over their movements without which a cure is hopeless, unless the greatest judgment and patience be brought to bear on them. It was to English horses of this class, when taken to the Continent, that reference was made in the introduction to this little book.

On the other hand, the Continental or riding-school system, aiming, as it does, at complete mastery over the propelling power—that is, the horse's hind legs—will, if hurried, or injudiciously employed, very possibly tend directly to call forth the spirit of resistance and insubordination; for it is precisely this control over their hind legs that horses dislike and seek to escape from with the greatest pertinacity and cunning, and it is only by almost imperceptible degrees that it can be attained, *when desirable*. For the correction of insubordination, it is, however, not only desirable, but indispensable; and it is therefore, generally speaking,

a comparatively much easier task to bring back truants originally handled in this manner to habits of obedience, than those that have been accustomed in their youth to the English *laissez faire* method.

It would be very easy, perhaps more to the taste of a certain class of readers, to lay down certain rules for this or that form of restiveness, and say, do this, if a horse rears, and that, if he rubs your knees against a wall, or insists on going home when you want to have a ride, but we have no faith in ready cut-and-dry receipts, and abhor all empiricism most thoroughly; moreover, there is plenty of it to be found, by those who prefer it, in most books on this subject. The real truth of the matter is this: whatever particular form of restiveness a horse may have recourse to "to defend itself," the one great patent fact in all cases is disobedience; and therefore the one great object to be attained is complete mastery over the animal's movements, and not merely over its body by means of straps and ropes.

We have stated that the English system of handling young horses is less likely of itself to produce insubordination directly, whilst the school system may, if abused, tend to this result. On the other hand, we must rely on the latter for the correction of restiveness; and the object of this chapter being to endeavour to show how vice may be *prevented and cured*, it seems advisable to lay before the reader a brief general sketch of both systems, pointing out, as we proceed, what is useful for our purpose in each, as also the means by which the one may be made to work into the other.

In the English method the first step is usually to put a very thick, and consequently very gently-acting, snaffle into the young horse's mouth, over which a

cavesson is placed ; a surcingle is then buckled round the animal's body, to the rings of which, right and left, the snaffle-reins are attached loosely, but still short enough to keep the neck and head nearly straight, and encourage the animal to *lean* on the mouthpiece. A judicious horse-breaker will then lead the young horse about, at first in a quiet place, and gradually on to roads, &c., where various objects present themselves, as horses, vehicles, houses, &c., to which his pupil becomes accustomed—a matter of great importance, as many accidents occur where a young one that has scarcely learned to tolerate a burden on its back is brought, under a rider, all of a sudden in contact with strange objects and unaccustomed noises. Moreover, the horse becomes habituated to follow the trainer, and obey the lounge and reins in a gradual and gentle manner, and a good understanding is soon established between them.

And this, be it remarked, is a method seldom practised by school-riders, or in military establishments ; the consequence of which is, that the young horse, when trained ever so completely in the riding-school, has to undergo a new course of instruction when it becomes necessary to take it out on the roads and streets, and frequently gets into messes that undo almost all that has been previously done.

Here, too, we find a practical hint for the treatment of full-grown horses that shy at particular objects and sounds, or object to passing certain spots. Treat them as the English trainer does his young ones, lead them about as described above, and reward them for their docility with a bit of bread, sugar, or something of the sort ; you will thus avoid all conflicts, the danger and

evil consequences of which are enhanced a thousandfold if you attempt to mount your horse under such circumstances. Of course, when shyness arises from defective vision, which is often the case, this method will be of no avail.

But to continue: After a day or two the trainer puts a saddle on the horse, and the surcingle over it, and will then soon proceed to lounge it, which he generally does single-handed, a point to be borne in mind. For general purposes he will endeavour, by gentle means, to get the young horse to settle down into a trot as soon as possible,* and in proportion as the animal takes kindly to trotting, his trainer will shorten the snaffle-reins somewhat, so as to encourage the animal to lean more and more on the bit, taking care, however, not to make them so short as to prevent the horse stretching itself well out, and bringing the propelling action of the pasterns of its hind legs into play.† This first lounging is always done on a large circle: first, because, if the horse does canter or gallop wildly, there is less danger; and, secondly, because the trot will be longer and more energetic, and the leaning on the mouthpiece more complete. The object of this procedure is to encourage the horse to throw its weight well forward, go ahead resolutely, and use its hind legs altogether as propellers. It may be well to give a caution here: grass-land or clay, when trodden hard, if moist, is to be avoided—the danger of slipping is too great; sand or tanner's bark if available—if not, a piece of dry fresh-harrowed field—is preferable.

* The trainer of race-horses does not wish this, of course.

† We shall see further on that the school system demands this from the hocks.

There are certain forms of restiveness, or rather kinds of tricks, that insubordinate horses try on and succeed with, because they have never been brought to have a proper leaning on the mouthpiece, of whatever kind that may be. For instance, they will get "inside" the action of the bridle altogether, so that the rider cannot keep them straight, and they will then turn sharp round and bolt off in another direction. When, therefore, one finds a horse succeed in keeping permanently "behind the hand," as it is called, the safest and surest way of bringing it up well to the mouthpiece again is by a few lessons on the lounge after this fashion, aided by judicious demonstrations with the whip, and remembering to use large circles.

It will be unnecessary to go into the detail of the first backing of the young horse, and of the precautions that should be taken to avoid exciting its fear or anger; and we therefore go on to the method of handling *under* the rider. The great object all English horse-breakers have in view is, to bring their horses to go straight ahead and cover as much ground as possible; they never think for a moment of making them handy, in the military sense of the term—that is to say, *capable* of circling to the right or left in all their paces,changing these and their feet without an apparent effort, &c.—for nothing of this is required of them. The methods they employ are, it must be said, perfectly suited to the object they propose to attain, the rider's weight being thrown either directly or indirectly on the horse's forehand, which, as has been shown in the first part of this work, favours progression on straight lines. The saddle is generally for this reason put well forward, the girths coming round the anterior

part of the chest. Now, although the saddle is placed forwards, the stirrups being usually very short, the body of the rider, from the hips upwards, is in most cases further back than the perpendicular line through the fourteenth vertebra, fig. 4; but from the hips downwards the legs are brought forwards towards the horse's shoulders, and the main reliance for the seat is with that portion of the leg from the knee down to the ankle, in the hollow close behind the horse's shoulders: therefore, although the rider's body is actually farther back than what we have described to be the normal position, the direction in which his weight is thrown by each impulse received from the horse's hind legs, is diagonally forwards on to the fore legs, and not in the vertical line shown by the arrows in fig. 4. Moreover, the rider's legs exercise in this their usual position all the influence derivable from mere pressure, or from the spur, wholly on the horse's fore legs, leaving the hind legs free from all control, for they almost always come too late when the rider endeavours to meet the horse's croup or fix its hind quarters.

The system of bridling and bitting is also perfectly suited to the object kept steadily in view, the horse's head being kept low, if necessary, with the martingal, which, of course, as has been shown, throws an additional portion of the weight on the fore legs. When, at a later period too, a curbed bit is used, this is put so high up in the horse's mouth that the action of the curb becomes more painful than that of the mouthpiece (see Part II. of this book), and consequently induces the horse rather to lean on the bit than yield in the direction of the rider's hand. Finally, this latter is, both with the snaffle and the curb-bit, held

as low as the horse's withers will permit, and quite steady—that is to say, without much varying the pull on the reins. Of course a judicious breaker or trainer will endeavour to prevent his horse acquiring a dead hard leaning on the bit, and seek to restrain this within the bounds of a firm decided one. Under the circumstances, however, this is not an easy matter, and is precisely the rock on which so many riders split, who then have recourse to sawing, which frequently becomes the primary invitation to restiveness.

We may sum up the whole by saying that the English method of training young horses consists in doing the whole work on the forehand, leaving the backhand almost totally uncontrolled to perform the simple function of propulsion—for all the trotting and galloping work is done on straight lines; and there can be no doubt that, where merely go-ahead straightforward work is demanded, this system is perfectly judicious. It is, however, another question, and one already sufficiently entered into in previous chapters, whether its application be not too one-sided, for all saddle-horses are not required to do this sort of work; and it is positively objectionable in this respect, that it uses up the horse's fore legs with frightful rapidity, and to an extent that none but English purses can endure.

It is, however, with its bearings on the subject of the prevention and cure of vice that we have here to do. Now there are certain forms of insubordination, or restiveness, in which horses depend on their forehand—others again, and by far the greater number, in which they depend on their hind legs—for the purpose of defying the rider; amongst the latter we may

specify, for instance, rearing. Considering the whole rationale of the English system attentively, one is therefore not surprised to find that the forms of restiveness in which horses use chiefly their hind legs grow very naturally out of this system, which is unfit for either their prevention or cure *without some further aid.* We would not be supposed to condemn this system altogether, or unconditionally; on the contrary, we have already pointed out some of it advantages, and shall now proceed to show that it may be made great use of, both as a preventive and remedy. As regards the former, for instance, it affords the only safe means of utilising horses that have weak hind quarters, or defects of the hind legs. Many such animals would if treated according to the school system, be soon rendered either total cripples or incurably vicious; whereas, by a judicious application of the English method, many a young horse gains time for the hind quarters and legs to develop themselves, and become in the end capable of doing even military work.

As to the cure of restiveness, the English method has this value. The first step to be taken with a restive horse, before any attempt can be made at mastering its hind legs, is to get it *to move somehow,* for it is only when in motion that the rider can get at it. Now, although it would be worse than useless to attempt to make a horse go under precisely the same circumstances of time and place, &c., under which it has refused obedience, still, by altering these circumstances, and placing it under quite different ones, we can usually succeed in this. For instance, as has been already mentioned, we can take a horse that proves restive on the road into a ploughed field, and, lounging it on a

wide circle, compel it to go without risking a conflict of authority in which we might probably have the worst of it. Or we may take the same animal into some enclosed space—a riding-school, for instance—where it sees that escape is impossible, and there, after having perhaps first lounged it, get on its back and ride it quietly. Under such circumstances, to attempt to screw it into a particular form, or endeavour to apply school methods directly, would most probably end in a fresh display of insubordination, and we should find ourselves pretty nearly at the end of our tether, and without any further resource. The great thing is to get the horse to *go somehow*—if only in a walk or a jog-trot, no matter: if we can only get thus far, half the battle is won, and by degrees we get into a good smart regular trot, if we take care to keep out of the corners, and avoid sharp turning. Now the English method, as described above, is precisely that best adapted for getting a horse to cover ground, and therefore, for the purpose indicated here, it is like getting way on a vessel by means of the head-sail, without which the rudder is perfectly useless; after a while we can haul aft our sheets till we get a weather-helm and steer any course we please. The English plan is therefore invaluable for getting way on, but to get a weather-helm we must have recourse to

The Continental or School System.—As the objects this proposes to attain are essentially different from what the majority of English riders aim at, so are also the means employed for the purpose. Whilst the latter demand from each individual horse the greatest possible amount of speed on *straight lines* it is capable of affording—treating the question of wear and tear of the animal's fore legs as a matter of secondary impor-

tance—the proper objects of the school are: first, to fix on standards of speed and work attainable by the averages of various classes of horses; secondly, to enable them to move with ease to themselves, and with the aid of the rider's one hand alone, on curved lines in various paces—that is to say, to make them handy; and, thirdly, to do all this in perfect obedience, and in such a manner that the inevitable wear and tear should be equally divided over all four legs, by which means the total period of service may be considerably prolonged. In a word, the English system is based on the competition of individual horses on the race-course and in the hunting-field, and therefore employs the fore legs exclusively as bearers, and the hind ones equally so as propellers, speed alone being the object; whereas, the school system contemplating the simultaneous action of bodies of horses in varied forms, excluding altogether the idea of competition, and not aiming at the highest degree of speed, transfers a portion of the weight to be carried from the fore to the hind legs, establishing thereby a more equable balance of labour. It is scarcely necessary to add, that the school is the nursery for military riding, which the hunting-field does not, and cannot profess to be.

The majority of English riders hold the school in the greatest contempt, simply because they are altogether preoccupied with their own ideas of the turf and the field, to which this is quite inapplicable; and merely mechanical school-riders return the compliment with equal unfairness when they point to our broken knees, stiff fore legs, frequently exceptionally restive horses, &c. It would be much more rational for both parties to endeavour to learn something useful from each other,

for both systems contain much that is good and useful for all.

It is seldom possible for the school-rider to adopt the preliminary education of walking the young horse out on the roads, &c., as is the excellent practice of the English trainer, and therefore the remount is taken at once into the riding-school to be lounged. The lounging itself, too, is carried out in a different manner, for it requires one or two assistants at first. One of these carries the whip; the other, usually the groom, is necessary in the first stages for the purpose of leading the young horse round the circle until it knows what is required of it. The assistant with the whip must understand his business perfectly—his services are most important and indispensable throughout. As a matter of course, during the first lessons, a very wide circle is used, and the snaffle-reins are attached loosely to the rings of the surcingle, the *inner one* being slightly shorter than the other, as it would otherwise hang slack when the horse bends in the neck and body in circling. The English trainer usually adopts the contrary practice of shortening the outer rein in order to prevent the horse running in towards the centre; but this object is much better attained through the agency of the assistant with the whip, because the great object especially in the subsequent lessons, is to meet and regulate the length of the stride of the inner hind leg by the inner rein, which however, always must have a sufficient counter-pull in the outer rein—the isolated action of any one rein resulting merely in a change of position of the head, instead of acting on the whole side of the horse.

When the horse has become accustomed to circling

on the lounge in this manner with sufficient freedom, the trainer proceeds gradually towards his ulterior object of bringing out a perfectly clean, that is, equable and regularly-cadenced, trot, by accustoming the animal to transfer a portion of its own weight from its fore to its hind legs, without thereby checking its forward impulse more than is exactly necessary. This is easily done by gradually shortening the snaffle-reins; and if the horse carries his head too low, by adding bearing-reins, for which purpose the dumb-jockey is useful. And now the assistant with the whip has the greater part of the work to do, it being his business, by demonstrations with that instrument towards the horse's *chest* underneath (not towards the hind legs), to keep the animal well up to its work, whilst the trainer himself moderates the pace by gently shaking the cord or line, never suffering the horse to lean heavily on his hand, and never himself taking a dead pull.

These two functionaries must act perfectly in unison, and both of them understand perfectly their work, which requires judgment, patience, and dexterity. Wonderful results may be obtained by a well-judged use of the lounge, but we are bound to say that, in unskilful hands, an enormous amount of mischief may be also perpetrated in the way of producing or confirming restiveness, or even with the more tangible evidences of curbs, spavins, and other lamenesses. It is impossible to give any precise rule as to the amount by which the reins may be shortened or the horse's head brought up. All that can be said is this,—if the horse hurries its trot, constantly increasing the pace, and finally breaking into a canter, you may be sure that the head is too low, and the weight still too much

forwards, consequently you must bear it up gradually till this ceases. On the other hand, if you find the horse trotting unequally and irregularly, in something like a mixture of trot and canter in an amble, or if it seems only capable of getting on in a short cramped canter, then you may be equally sure that your reins are too short, and you must immediately ease them all to the state in which they were at the very first lesson, and then try back till you bring out a perfectly clean rhythmic trot; whatever position the horse's head and neck may *then* have, is the true one, all the pedants in the world notwithstanding. Indeed it is a good plan to finish each lesson and commence the next one with somewhat slack reins. The being too lazy to take the trouble of altering the gear often causes double work, and a horse will bear more pressure, on the whole, with good temper, if you reward it by occasional spells of relaxation.

It will not be out of place here to remark, that if your horse be weak in the hind quarters or legs—that you cannot go so far with the bearing up, in fact—you must incline more to the English system; whereas if it has suffered only in its fore legs, you may carry the process to the utmost extent that is compatible with clean trotting; and this is precisely the reason why many an English horse, with ruined fore legs, may be rendered capable of doing good and safe service as an officer's charger for many a year, if handled judiciously after this fashion.

We now come to the period when the young horse has been saddled and backed. The animal will, during the process of lounging, have become accustomed to the saddle being placed on the centre of its back and

the girths round its proper waist, instead of round its chest. During the first lesson under the rider, the horse will continue on the lounge, the great object being to make the transition as gradual as possible, for which reason the assistant with the whip will continue his services, whilst the trainer also continues to direct the animal's movement with the line. The rider, therefore, will at first remain nearly passive, avoiding, on the one hand, interfering too much with the reins, and, on the other, pressing too closely his legs against the horse's body; in fact, his seat will be very much like that of the English trainer in the first instance, but by degrees he will take the direction of the horse's movement over from the trainer into his own *hands*, and with his ***legs*** do the duty hitherto performed by the assistant with the whip. For this reason he will then change his seat, bringing his legs well back so as to get a perpendicular tread on the stirrup, and holding them close to the horse's ribs without screwing. A slight increase of pressure of both legs *here in this position always* has the effect of making the horse bring its hind legs forward *under* its body, just as the whip does; and if, at the same time, the horse's head and neck are brought up and back, the relative proportions of weight to be carried by the hind and fore legs can be easily determined by the rider.

Let us now suppose the remount so far advanced so to enable us to dispense altogether with the lounge and the whip, and hand it over to the rider alone; in fact, to be in the stage of its education corresponding to that in which the English trainer takes it out for long rides on straight lines. The school rough-rider, on the contrary, does his work in an enclosed rectangular

space,* which makes all the difference in the world, because during each circuit of the manege four corners have to be got through—that is to say, as many changes of direction made. Let us take the rider, in the first instance, as being on one of the long sides of the rectangle, on which hand is immaterial : his English *confrère* holds his hands close together steadily down on the horse's withers, just *letting* the animal come up to meet the mouthpiece ; the school-rider, on the contrary, raises his hands more or less according to the natural position of the horse's head and neck, his object being, as we have seen, to bring their weight back towards the hind legs, which latter the pressure of his own legs tends to bring forward. Moreover, instead of holding his hands merely passive, he takes a rein in each hand, and with a gradual but decisive turn of the wrist *meets* each stride of the hind leg with a gentle pull on the rein at the corresponding side, working upwards and backwards. Thus, whilst the pressure of the man's leg brings the hind leg of the remount forwards, the pressure of his wrist, exercised through the rein, determines exactly to what extent this shall take place, and, in fact, prescribes the point at which the foot shall be placed on the ground. This is what is called floating or oscillating between the rider's hand and leg ; it is what gives perfect control over the horse's movements, and explains why the terms "mere rein" or "mere stirrup" riding are used in a satirical sense. A little attention will soon teach even a beginner which hind foot is being brought forward, and consequently with which rein he will have to regulate its action ; for it

* The circus, properly so called, is only used for purposes of exhibition.

will never answer the purpose to pull across, as that would only derange the position of the neck and head; and this "feeling in the seat," as it is called, is a sense that riders must cultivate, as it will enable them to find out *immediately* what their horse is about, and whether he be meditating mischief, which, if his leg be in the right place, he can nip in the bud; whereas, if it be somewhere away towards the horse's shoulder, he is sure to come too late.*

The corners and changes of direction must not be overlooked. At first these must be got through in a wide sweep, for which the lounging was sufficient preparation. By degrees, however, this sweep is narrowed, and the change of direction made more abrupt; we must therefore see how this is to be effected, and what results it produces.

When a horse moves on a segment of a circle, we must consider the two inner legs as moving on an interior somewhat narrower, and the two outer ones on an exterior somewhat wider curve. The difference between the two, although not very great, is nevertheless sufficiently so to compel the animal to shorten the strides of the inner legs perceptibly, and the shorter the radius of the circle, the more perceptible is this difference. When the rider is therefore about passing through a corner, he will come to the young horse's aid by urging forward the inner leg somewhat less than the outer one; at the same time he must bend the horse's neck and head in the proposed direction, and therefore he holds his inner hand somewhat lower than the outer one, makes his own leg at the same side more

* For the same reason it will not do to rise in the stirrups, English fashion, for we should miss each alternate tread.

perpendicular, the outer one being brought well back to sustain the action on that side. Now the result of all this is, that the inner hind leg is made to bear a somewhat increased proportion of the whole weight during the passage of the corners as compared with the straight line ; and, thus by changing from one hand to the other, the young horse learns to bend his hocks in succession, and in an easy and gradual manner. After passing through the corner, and getting on again to a straight line, the action of the rider's legs is again equalised, but his hands always remain in the position described, as the horse's head must be kept slightly away from the wall or barrier.

This process is graduated thus : first, round off the angles in a wide sweep, then gradually narrower ; secondly, halve and then quarter the manege, by which means the angles will come more frequently into play; finally, convert your smallest rectangle into a circle, and wind up by diminishing its diameter, changing, of course, from one hand to the other, in order to work both hind legs equally.

There are two distinct means employed here : first, the getting the horse's head and neck up and back—to use a nautical expression again, more inboard ; secondly, to accustom the horse to bend its hocks and haunches so as to take over a portion of the weight. Unless greatly pressed for time, it is better not to commence both processes at once, and much preferable to devote attention, in the first instance, to the position of the horse's head and neck ; and when some progress has been made with these, then go on to the hind legs. Therefore the seat and the position of the rider's legs will be at first more analogous to the English

fashion, reverting, when the time comes, to the school position as a matter of necessity. A certain portion of the work of getting the horse's head and neck into position may be very advantageously done whilst the animal stands still, but no real progress can be made in getting it to carry its burden in the desired manner unless these bending lessons, as they are called, be immediately followed up by brisk trotting ones; and, for the same reason, it is of great importance, when practicable, to take the horse out of the school occasionally, and let it have a good straight-ahead go after the English fashion.

The dumb-jockey being much used in this country, it becomes necessary to say a word on the subject. This instrument represents a pair of hands without legs, and therefore can at best only perform just one-half of the work we have now under consideration, and even this imperfectly. We must therefore call the whip to our aid in order to supply the want of the legs, which the whip will do, but then we can never attain the alternately graduated pull on each rein successively, nor vary the pressure so readily. Moreover, the problem to be solved being the distribution of weight, with the dumb-jockey we can only adjust that of the animal itself, the whole of whose equilibrium being overthrown when the rider once gets on its back, we are then compelled to begin the entire process *de novo*. The judgment, tact, and power of appreciation of a really good rider will produce far better results, and, on the whole, in a shorter time than the dumb-jockey ever can do, except perhaps as a triumph of art in the circus, or for the purpose of combating some special form of vice; nevertheless it is evident, from what has

been just said, that this instrument may be used with advantage by those who wish to train on the English system. What we have here given is merely a sketch of so much of the school system as suffices to bring horses *into obedience*—in fact, the A B C of the method—as it would lead us altogether beyond the limits we have proposed to ourselves to go further than this into the detail of manege-riding, even if we felt ourselves competent to do so, which is far from being the case. Our object was to show by what means, within almost every rider's reach, perfect control may be obtained over the horse's head, neck, and hind legs, and this because it is by the aid of these members of its body, especially the last-named ones, that the vicious or insubordinate horse is enabled to defy its rider.

Up to the point at which we have now arrived it will have been most advisable to use a snaffle, either alone or in combination with Seeger's running-rein, which enables us, whilst we lift the horse's neck and head by the upward and backward pull on the snaffle-reins, to limit exactly the degree to which this elevation takes place. When the neck, and with it the head, have been got into the desired position—which is, we repeat, always that in which the horse trots perfectly "clean" and in "obedience"—the next step is to get the head into its proper position with regard to the neck, and this is done by means of the curbed bit.

What sort of bit should be selected, and how it ought to be put into the horse's mouth, has been already fully explained, and all that will be further necessary is to accustom the horse *gradually* to this in precisely the way pointed out already for getting it to accept other limitations of its freedom. If all this be

done carefully, skilfully, above all, patiently but resolutely, the result will be a horse moving in complete obedience to the will of the rider, at all degrees of speed, with perfect ease to itself, and without apparent effort on the rider's part; for the animal will have learned to modify the propelling and bearing action of its hind legs in accordance with the pressure exercised by the rider's legs, whilst the lever-action of the head on the neck produced by a properly-fitting and carefully-adjusted bit being transmitted directly to the anterior extremity of the spinal column, and indirectly through the medium of the reins towards the centre of *motion*, will regulate the amount of action most effectually. The two figures of Plate V. illustrate in different senses what we have here endeavoured to convey by words. The upper one shows a horse whose hind legs are subject to no efficient or direct control, the action both of the bit and of the rider's legs being concentrated altogether on the forehand through the diagonal tread on the stirrup and the pull on the reins directed upwards towards the rider's neck. The lower figure, on the contrary, shows a horse whose body moves under the perfect control of the rider: the tread on the stirrup is vertical, the pull on the reins not far from horizontal, and directed towards the rider's seat and the common centres of gravity and motion. Both figures sit nearly exactly on the same part of their respective horses. The great difference between the seats lies in the position of the leg from the hip, and especially from the knee, downwards; whilst the great difference in the carriage of the two horses lies in the respective positions of their necks. Some of the other plates illustrate the same thing in different ways.

CHAPTER II.

GENERAL RULES FOR THE TREATMENT OF RESTIVENESS.

THE first and most important rule to be observed is, *to ascertain the cause of the restiveness, and the circumstances under which it was first displayed and is usually repeated.* This alone will frequently suffice to suggest the proper remedy, as it will also show us how vicious habits may be best prevented, especially with young animals.

It is worse than useless to take your horse to the street-corner, the cross-roads, the bridge, the railway crossing, or the house, &c., where it is in the habit of offering opposition to your will, as this only leads eventually to a trial of strength, in which the horse is always superior. You must choose a more favourable ground—namely, intelligence—in which man ought to be superior to the brute creation, which, however, by no means precludes the necessity of administering judicious punishment when necessary, and altogether excludes the idea of tamely truckling to the animal's insubordination.

The principal causes of restiveness are to be sought, either in some physical defect of conformation, in the condition of the animal, in its disposition, or in its temper, and sometimes in a combination of two or more of these.

With young animals especially, defects of conformation—as weak backs, hind quarters, or something abnormal about the head and neck—lead them into insubordination in self-defence. Want of ability to do the work demanded of them, in consequence of defective condition, will produce the same effect both in young and old horses; starvation is, therefore, in most instances, a positively injurious instead of a curative process. No doubt a horse's temper may be subdued to a certain extent by this means, but then it becomes unfit to do work, so that nothing is gained in the end. As regards disposition, some horses refuse their work from sheer sluggishness; others, again, from timidity or irritability. This latter is very frequently the case with mares, especially at certain seasons of the year, and may be very often remedied by putting them to stud for one or two years. It is obvious that one method of treatment is not applicable to these very different cases. Finally, a merely passionate temper requires different management from a dogged one; whilst sheer vice is the most difficult of all to deal with, and usually a consequence of injudicious treatment. When all this has been well considered, and the cause or causes of restiveness ascertained, one can begin to work with some chance of success—otherwise not.

The second general rule is very easily deducible from the first—it is this: avoid giving the horse an opportunity of resisting your will successfully, so long as it possesses the means of doing so—that is to say, until you have acquired, by the means already described, complete control over its movements. Therefore have your horse led into a riding-school or some enclosed space where it has never shown restiveness, and do your work

there, and after each lesson dismount again, loosening girths, &c., also caressing the animal, if obedient, and avoiding to push it prematurely to the verge of resistance, trusting rather to gradual progress than to violent measures. All horses are very susceptible to, and grateful for, kindness.

As an enclosed space is not always available, it will be well to point out what can be done without it, in case of necessity. Some horses refuse to leave their stable, either from natural sluggishness or indisposition to leave their companions. A man on foot armed with a whip will often succeed in driving them away, but in this case it is his will and not yours that has prevailed, and therefore little real progress is made. It is much more advisable in such cases to lead the animal away to some distance, taking with you a nosebag with some oats, of which you give a handful now and then. You may after a time mount your horse, and when on its back give it a handful of oats from the saddle before attempting to go farther, getting its head, of course, in the proper direction. If you find this not to succeed at first, dismount again rather than risk a conflict, lead the animal out a couple of miles, and give it the whole contents of the nosebag at some convenient place, taking each day a different road, and never feeding twice in the same place. You may *always* ride home, and this will be your opportunity for acquiring control over its neck, head, and hind legs : the more it hurries back to its stable, the better will you be enabled to do this work.*

* It will be well to dismount at some little distance from the stable and lead the horse home, never repeating this operation in exactly the same place.

Or if it be a case of attachment to the stable companions, then put a rider on one of these, whose business it will be to keep sometimes alongside of your own horse, at others ahead, or again in the rear, making circuits, riding away and returning—the nosebag with oats may be superadded to this method of treatment; and thus the animal may be got and kept under way constantly, which gives the rider the desired opportunity of working it—for this is the main object to keep in view. Two or three servants riding together, and thinking only of their own amusement, will teach horses to cling to one another; or one riding the same dull constant round will stupefy a horse into restiveness, of which it may be cured by the above method.

But if you have an enclosed space of some kind to work in, 25 to 30 yards long, and 15 to 20 wide, it will be much better to use it in the first instance; and then, when you feel it to be safe, ride out occasionally till the cure is complete. Of course your main object will be to get the horse to go *somehow* in the first instance, and then by degrees in obedience, the means of effecting which have been already pointed out.

Should the restiveness be traceable to physical defects—to weakness of the back, loins, hind legs, or to some peculiarity of conformation of the head and neck, as is especially the case with horses that seek to defend themselves by rearing or "bucking"—you must adjust your seat very carefully, and sometimes even change your saddle with that view. It is a great mistake in such cases, under the pretext of getting what is called a good firm seat, to rest your whole weight on the horse's loins, by placing yourself at one end of a long saddle, and tucking up your legs with short stirrups at the other

end. On the contrary, one must get well down into the centre of the saddle, with somewhat of a fork seat; and the bringing your weight forward must be accomplished, not by bending in that direction from your hips, which will lose you all control over the horse's neck and head, but by bringing the seat itself into the proper place.

With irritable impatient tempers it is important to sit as steadily as possible—a close seat is what suits them best; they also require very careful and accurate bitting; anything painful exasperates such horses.

So too, with horses that want to go; indulge them and moderate their fire gradually; whilst with sluggish ones encouragement will suit best; and as regards food, let it always be in proportion to the work, and this latter to the condition.

Of course it is impossible to lay down a ready cut-and-dry rule applicable to the treatment of each individual horse; but it will be almost always advisable to have recourse to the lounge in the first instance, if for no other reason, because it affords the best opportunity of seeing and studying the horse's action, and ascertaining exactly the means by which it resists; for instance, as is frequently the case, by slinking back from the bridle, and gathering up its legs under its body, and putting up its back at the same time. In such cases it will be best to continue the lounging at first on the English principle, and subsequently after the school method described above. If it seems advisable to get the horse's head and neck up, the dumb-jockey will be very useful; if, on the contrary, these require to be brought down, it will be useless; and with horses inclined to rearing it should never be used

on account of the danger of their throwing themselves down.

When one finds the horse inclined to trot out well and freely on the lounge, it will be time to get a rider on its back, and then to alternate the lounging and riding lessons as may seem advisable until the former become unnecessary. With *restive* horses it is, however, better not to attempt using the lounge after the rider is on the animal's back, but merely to detach the cord, leaving the cavesson on their heads, and giving the rider a pair of short reins, attached to this, into his hands, in addition to the snaffle-reins. Except in very skilful and practised hands, and when both trainer and rider are accustomed to act in unison, there is always great danger in using the lounge in this way.

The general plan is, therefore, simply this: first, lounging with loose reins; secondly, lounging with reins gradually shortened until the hind legs are brought under subjection, the horse still going free; thirdly, riding with loose reins; fourthly, riding with shortened ones, varied with bending lessons—at first whilst standing still, then in motion; finally, occasional rides out and giving up the school by degrees till it may be finally dispensed with altogether. Patience, determined cool courage, intelligence, kind treatment, and perseverance, are the main requisites; there is no royal road—the thing can only be done by fair work.

There are some horses that cannot be got to go *anyhow*, but will either take to backing, turning sharp round, generally on the near hind leg, rearing up, screwing themselves up against a wall, climbing up houses, or throwing themselves violently on the ground. Such animals have been usually brutally, or at least

injudiciously, treated, and in most cases it will be advisable to hand them over to professionals, who should in common fairness be told the *whole* truth. A riding-school is, however, not always within reach, and we must therefore see what can be done with horses that have acquired vice to this extent.

The first step to be taken in such cases is *to restore confidence*, and make the horse feel that it will *now* be subjected to kind and judicious treatment. This must commence in the stable, and the foundation is best laid by the man who feeds and cleans the animal; and here let it be remarked, that an example of violence or severity given by the owner or trainer but too frequently induces the groom to follow it up, and should therefore be very carefully avoided. If, on the contrary, the groom succeeds in getting the horse to move about in his stall and turn round, a good foundation is thereby laid for the further treatment, and the trainer will do well to follow it up himself precisely in the same manner, giving the animal a handful of oats, a piece of bread, or a lump of sugar, which most horses are very fond of, whilst others prefer common salt. When you have got thus far, let the groom lead the horse out in a convenient enclosed space: at first it will be best to put nothing further on it than a snaffle, a surcingle, and a cavesson. When *on the ground*, the trainer may approach it quietly, and, giving it some tit-bit, make much of it, and then, with the assistance of the groom, fix the reins of the snaffle loosely to the rings of the surcingle, and firmly attach the line to the centre ring of the cavesson, carefully avoiding all compulsion. When this has been accomplished, gather up the lounge-line in a neat and

regular coil in your left hand, so that if the horse makes a bolt it may run out without entanglement; and seizing the line about three or four feet from the cavesson-ring with your right hand, place yourself in front of the horse, the groom standing behind you.

Before proceeding further let us consider for a moment what position restive horses generally assume at the moment they defend themselves. In almost all cases it will be found that they gather their legs under the body, sinking their croup, which may be seen from the position of the tail, getting their head and neck well down, and *putting* their back up like an angry cat. If the reader will now refer to Plate I., and compare this with fig. 4, he will at once see what the object of this position is. The horse's body is bent round the centre of motion (fourteenth vertebra) like a bow pulled to the archer's ear, ready to exert the whole of its elastic power. If the arrow be once discharged, your control over it is gone—so, too, if the horse makes the plunge it contemplates; therefore your first task will be to unstring the bow.

The first step to this is to get the horse to stretch itself. Try to get the head up a little; if you meet with opposition, give way, as if you did not perceive it, and try again. In proportion as you get the head and neck up gently the back will flatten down, and the horse will move one or both hind legs backwards, or one or both fore legs forwards. The horse does so merely to save itself from falling; you will do wisely by giving it credit for a first act of obedience, therefore pat its neck, rub its head, speak kindly, and give it something. If it has only moved one hind or one fore leg, by bending the head and neck gradually towards

the other one, this too may be got backwards or forwards: by degrees the horse will be got to stretch itself: the bow is unbent. It will altogether depend on the time and trouble required to get thus far, whether the first lesson should be further extended or not. After a quarter of an hour or twenty minutes it will be time to reward the horse by loosing all the straps, leaving it to the groom to *lead* it about for exercise and then home. Better take the trouble of giving two short lessons each day, after which all parties remain on more friendly terms, than one long one ending in a fight.

Having explained at length the *method* of proceeding, it will now suffice to indicate briefly the successive steps to be taken. When the horse has learned to stretch itself willingly, the next object will be to get it to move in obedience. If it refuses to go forwards, by edging over its head and neck in the proper position, it will step sidewise to save itself from falling; reward it again. In a day or two it will follow your hand forwards for the sake of the oats you show it; then by degrees it will learn to circle with the croup round the forehand; you will "unfix" the feet and flatten the back by degrees, taking care always to stop each movement and limit its extent with the cavesson; real obedience is thereby established, and the horse will soon follow you in a wide circle, when, the assistant taking your place at its head, you at length arrive at lounging, and proceed as already described.

A horse that backs—and some will actually trot backwards— must be somewhat differently handled, but still on the same principle: there is even less difficulty than in the cases just now alluded to, because the

animal does move somehow. The position assumed by a backing horse is that described above; the remedy is therefore to alter the carriage of the head and neck, getting these *up* as high as possible without violence, and the weight being more thrown inward, the back is flattened and the hocks bent instead of being stiffened as before. This soon brings the animal to stand still, which, however, should not be permitted; on the contrary, it must be made to go backwards in obedience to the cavesson one or two steps, the head well up; which done, reward it by suffering it to go ahead—and repeat this backing process until it goes willingly forward, when it may be handled as already directed.

In applying this method when on the horse's back, care must be taken to use each hand and heel (spur) in unison, "stopping" with the latter the backward tread of each hind leg alternately on the off and near sides, and not suffering the horse to put one hind foot to the ground too far away from the other, for one hock is then sure to be stiff. The pull on the rein must be, of course, upwards and backwards at the side corresponding to the hind leg you want to act on, and only upwards at the other side. If the rider hurries the horse back, fails to sit perfectly upright in the saddle, and makes a muddle of the action of his hands and heels, there will always be danger of the horse rearing up and falling back: in fact, this special form of restiveness is very often called forth by injudicious management of a backing horse; whilst, on the other hand, making a rearer rein back *in obedience* is one of the best remedies we have for rearing.

To prevent misapprehension, it is necessary to explain how it is that the spur will stop the hind leg

and limit its action, which is simply because the effect of the spur or heel being always to make the horse advance the hind leg at the same side when the animal is backing, this becomes, in fact, equivalent to stopping it; whereas, when it is going forward, the contrary effect is produced, and the stopping work done by the rein, as already explained in the preceding chapter.

It has been shown above that, with the cavesson, it is possible to lay the foundation for forward action by making the horse, in the first instance, circle with his hind quarters round the forehand. When mounted, precisely the same method may be employed with great success. The rider commences by lifting the horse's neck and head with *both* reins until the animal's mouth is somewhat higher than his own knee, keeping the calves of his own legs well closed on its ribs; then, by a gradual shortening of one rein, say the right one, he gets the head round till the forehead comes to be parallel to the horse's backbone, and places his right hand firmly on the saddle behind his own right knee, and so gets a *downward* pull on this rein, whilst with the left one he keeps the horse's head and neck in the proper position. Frequently a mere increase of pressure of the right calf will now suffice to unfix the horse's legs, and make it circle with the croup round the fore legs, which remain on the spot, and finally induce it to go ahead. Of course the outer, here the left, leg of the rider must be kept well closed up, so as to determine the velocity at which this circling is done, and the extent to which it should be carried, as also to be in perfect readiness to act in unison with the other leg, and with both reins, to determine the horse to move

straight ahead when it evinces the disposition to do so. But still more frequently, perhaps, the pressure of the calf will not suffice, and then one must use the spur freely, and this will generally succeed. Dead pulling on the reins will not do; the rider must increase and diminish the pressure alternately, and always in unison with the action of his own heels or spurs; and this latter should be screw-like—not stabbing or digging at the horse's side, which involves a loosening of the hold, and accustoms a horse to wince away or flee the spur, instead of yielding obedience to the pressure of the calf. This is what the Germans call "wickeln"—that is to say, winding or rolling up a horse—and, if properly done, is very efficacious for overcoming restiveness generally; if employed in the nick of time, it will even prevent rearing.

On the whole, it is evident that a key to the best methods of mastering the horse's powers, and utilising them fairly, whether merely for handling young ones, or for the prevention and cure of restiveness, is to be found only in a thorough knowledge of the mechanism of that animal's movements. This we have endeavoured to explain in Chapter I., Part I., of this book; and those who will take the pains to compare what is said there with what they see restive horses do, will be thereby enabled to discover for themselves more than we can pretend to teach them.

We would also venture to recommend the chapter on "Seats" to the attention of rational riders and trainers, but especially of those who have to deal with restive horses. In that chapter we could do little more than hint at general principles so far as they are applicable to various kinds of riding; here we can lay

down positive rules for the seat, and give reasons why it should be so and not otherwise.

We have seen how a horse that meditates resistance gets its legs under its body, coiling itself up, as it were, round one fixed point, the fourteenth vertebra. The nearer the rider's *seat* is to that point or centre of motion, the less will it be liable to disturbance from the violent efforts that ensue. If he sits further back towards the loins, his weight being there will interfere with his management of a rearer or a backer, and expose him directly to the action of a kicker; if, on the contrary, he sits close to the horse's withers, he unduly overweights the forehand, and loses most of his control over the hind legs. Let us compare together, for instance, the upper and lower figures of Plate V. on the supposition of the horses wheeling sharp round suddenly; those of Plate VI. on the supposition of their attempting to rear or kick; and those of Plate VII. on that of their attempting to back against the will of their respective riders. As to the hindermost figure of Plate III., selected purposely to illustrate an exaggeration, he can do nothing with his horse.

As regards the position of the rider's legs, the upper figure of Plate V. and the lower one of Plate VI. sprawl them out forwards, and the upper one of Plate VII. sidewise, with stiff knees away from the horse's ribs, so that they must *alter their whole seat* when they require to give the spur, which must be applied in this position with a stab, instead of growing, as it were, out of and being the climax of the pressure of the calf, the importance of which we have seen.

The position of the rider's body from the hips upwards is by no means indifferent. The getting up the

horse's head and neck to the required position demands a certain amout of fixity of the spinal column, for the work to be done by the arms brings into play the muscles of the entire back. The rider that comes into antagonism with his horse is only then safe in his seat when his own centres of gravity and motion fall in the same perpendicular line with the horse's centre of motion, otherwise he will have to contend with the centrifugal motion by dint of muscular exertion alone.

Now, for a man standing upright, the centre of gravity is in the perpendicular from the base of the skull, and the centre of motion is at the point where this line intersects a horizontal line drawn through both hip-joints. If the rider sits upright, on his "triangle" (as explained above), and in the middle of his saddle, this being in the right place, his legs will, unless the stirrups obstruct, come of themselves into such a position that his own centres of gravity and motion will be directly over and very close to the centre of motion of the horse. What Englishmen are pleased to call "a stuck-up seat" may be the result, perhaps, especially if the rider be awkward; but it is not a question of taste or fashion, but of attaining certain definite objects which remain otherwise unattainable; for no one will pretend that the position assumed by the hunting man for the purpose of making his horse throw its weight on the fore legs, with its head and neck well down *and extended*, can also serve the exactly opposite purpose we have in view in the correction of vicious animals.

A word with regard to the whip and its use will not be out of place. The effect of this instrument depends altogether on the part of the horse's body to which it

is applied, and the way in which it is used. One or two strokes given at the proper moment, and in the right place, will sometimes work wonders, whilst a severe flogging almost always does mischief. It has been pointed out that, in lounging, the whip may be made to do the work which the rider does with his legs and spurs, and that, for this purpose, it should always be applied under the horse's chest, about where the girth lies, and never to the buttocks or hind legs, as this usually ends in kicking. The same rule applies equally to the riding-whip ; but this may be also used to great advantage on the horse's shoulders—as, for instance, in cases where the horse is preparing to rear—the effect being to unfix its fore legs from the ground and make it put them forward, just as, when applied, under the belly, it brings the hind legs in the same direction. Therefore it is absurd, when a horse defends itself by gathering its legs under it, to strike it under the belly, whereas one or two strokes smartly applied to the shoulders may probably have the effect of getting the fore legs stretched ahead. The promptness and rapidity with which the stroke is given, wherever applied, determines, to a great extent, its value ; for if the horse sees it coming, it will flinch away if possible, just as it does from a far-fetched stab with the spur ; and it can do this much more easily with the hind quarters than with its forehand, which is precisely the reason why a flogging—that is, repeated blows aimed at the same place—is generally useless, to say the least, whilst one or two on the shoulders tell at once. The manner of holding the whip or rod has much to do with this. We have often been amused at hearing would-be sportsmen turn Continental

riders to ridicule for holding their whips or switches with the point upwards, as if they only wanted to imitate a sabre, whereas this is in reality the position from which a quick smart stroke on the shoulders can be most effectually applied; for if the point be held downwards, it must be first brought up, and then again down, so that it probably comes too late.

CHAPTER III.

SPECIAL FORMS OF RESTIVENESS.

In the preceeding chapter the general method of treating restiveness has been sketched in outline; what is there put forward will be found applicable to nearly all cases, and also suffice for the cure of most forms of disobedience. There are, however, some others which, in addition, require special methods of treatment, especially when they have become inveterate; and these are—bolting and running away, bucking or plunging, rearing, and kicking.

Bolting.—The first step to be taken is to ascertain *why* the horse bolts. A nervous and excitable temperament is sometimes the cause, and the only remedy will be quiet and judicious treatment. Much more frequently, however, bolting is resorted to by horses that have some physical defect or peculiarity of conformation, as a means of avoiding what gives them great pain; in fact, it is frequently rather an effort of despair than anything else, and an evidence that something has been demanded of the animal that was beyond its strength.

Fig. 7 show the heads and necks of two runaway horses; in the one case the animal's nose is poked straight out—in the other, the chin comes back so as nearly to touch the breast; in both it escapes alto-

gether the action of the mouthpiece; but the difference of position assumed points to corresponding difference of conformation. The undermost figure shows that the way in which the head is set on the neck, and the build of both, offer no obstacle in themselves; and the presumption is, therefore, that there is something weak or defective in the loins, hind quarters, or legs. On the other hand, in the upper figure there is evidence that such obstacles do exist in the head and neck, the hind quarters being, perhaps, very powerful. In a word, horses with short necks, narrow jaws, and ill set-on heads, or, again, with long unstable necks, endeavour to escape the pain occasioned by injudicious attempts to force these into a certain shape by running away in the position of the upper figure; whilst those with well-formed heads and necks will, if their hind quarters be weak, usually adopt that of the lower one—the getting down of the head alone bringing the weight well on to the fore legs and consequently easing the weak part. It sometimes happens that there are defects at both ends, and want of judgment or temper in the rider will easily drive such a poor weak creature to despair; for those who have had much experience with young horses must have remarked that the powerful and well-built ones seldom take to bolting unless there is something wrong with their tempers.

The first impulse of the great majority of riders whose horses bolt is, to put a sharper bit into their mouths, or at least to shorten the curb, and perhaps rig the horse out with some sort of martingal or running-reins that gives them a good hold of the head, to secure which more effectually they plant their feet firmly in the stirrups, probably at the same time throwing their

own weight as far back as possible towards the horse's loins. Energy is an admirable thing, but the energy of stupidity seldom avails much; and the above plan of proceeding is nearly sure to make matters worse, and convert a terrified animal into a vicious one. For whether the anguish the poor horse endeavours to escape from has its seat in the hind quarters or in the head and neck, severe bitting is sure to aggravate it, and a rude hard hand will do the same. The best, in fact the only, remedy for a bolter is, a very carefully fitted and well adjusted bit, a perfectly painless curb, a light hand, and last, but not least, a very firm steady seat, somewhat forward with horses that have weak hind quarters.

It is always a good plan to put a bolter on the lounge, not, indeed, as is generally done, with the idea of letting it exhaust itself, for weakness is more frequently the exciting cause than strength; but for the purpose of studying carefully its action, and finding out by degrees in what position or trim it will go steadily and quietly in different paces. The object will be, of course, with a horse that is weak behind, to train it on the forehand, getting its neck just sufficiently high up to prevent its being able, when the bit is applied, to bend its head round towards the hand, so as to escape altogether the lever action of that instrument; but, on the other hand, not so high or so far back as to throw the weight on the hind legs. This will also afford a key as to the dimensions of the lower cheek of the bit.

With a short-necked, narrow-throated, heavy-headed, perhaps straight-shouldered horse, possessing good serviceable hind quarters, the first object will be to get

these to bear the weight gradually in the manner indicated in a previous chapter. This will, of course, require a higher and gradually ascending position of the neck; but as the difficulty probably arises in the junction of the head with this part of the body, no attempt should be made to bend the nose downwards, for that is what annoys the horse. The best gear will be a bearing-rein like that used for carriage-horses, but with the rings as close under the horse's ears as possible, so as to lift the neck unbent at the part known as the poll. In both cases the dumb-jockey is useful if judiciously employed.

Subsequently, when the horse has learned to bend its hocks, you may bit it with a light well-fitted bit, which will bend the neck downwards without altering the junction with the head; in fact, what is technically termed "a false bend" will be attained, which, however, suffices to render the animal controllable so long as the rider preserves the mastery over its hind legs, by keeping his own close to its body. In riding such horses, it is useful, when you find them beginning to rush, to bring them *by gentle means* to stand still, throwing your own body, from the hips upwards, somewhat forward, and easing the reins altogether for a moment; whereas the common practice of unskilful riders is to throw themselves back and pull like grim death.

Reining back may also be employed, but not with horses that are weak behind, nor otherwise than in a proper position, so that the horse retires gently—the contrary of backing, and never as a punishment. Generally it will be preferable to stand still, and encourage the horse, by feeling its mouth, to champ the mouth-

piece, when the stiffness of the head and neck will gradually relax, and it may be put in motion again.

Here it may be well to say what the rider should do if his horse runs away with him. The general impression seems to be, that the safest thing is merely to endeavour to keep the animal straight till it gets tired of galloping, and keep one's own seat as long as possible; consequently the rider plants his feet as firmly as he can in the stirrups, and shoves these out towards the horse's shoulders in order to get fixed points from which he can have a *dead* pull on the reins, and of course his body, from the hips upwards, goes to the rear, right over the horse's loins. Now, although this method of proceeding suggests itself very naturally, it is nevertheless all wrong, as, indeed, must be quite clear to those readers who have read the preceding pages with any degree of attention; for whether the difficulty has its seat in the horse's hind quarters, or in the throat and neck, it is sure to be aggravated in this way; besides that one can seldom reckon upon having room enough to try this experiment without encountering some obstacle, or a sharp corner, that brings horse and rider down with a smash.

Let us take the case of a horse running away in a field or open space, in the first instance, as being more easy to deal with. Here the principal object must be to take your horse *off the straight line and on to a circle*—at first, of course, a wide one, but by degrees gradually narrowing. On a circle one has room enough even for the tiring process, seeing that it never ends, but the thing is to know how to get and keep the horse on to it. In the first place, then, it requires simply coolness and self-possession sufficient to enable

the rider to sit well down in his saddle, bringing his legs *well back* and keeping his body *upright*—the legs being required *there* to regulate the action of the horse's hind legs in the manner already described, whilst the upright position of the body affords a basis from which the arms can work. Next, instead of pulling a dead pull on both reins alike, the rider must take intermittent pulls on the one at the side he wishes to turn towards, gradually increasing the strength of the pull, and then as gradually relaxing to begin again; holding the other rein merely "counter," so that the pressure shall be exerted only through the mouthpiece, whatever the bit may be, and not through any other portion of it, which would be useless. This intemittent pull on the rein must, however, be *always* accompanied by a similar pressure of the leg, or if necessary, spur, *at the same side*, the rider's hand and leg acting in perfect unison; and this will never fail to turn the horse gradually, just as is required. The circle affords, however, not merely an opportunity for avoiding dangerous obstacles; its great value is, that it also enables the rider, by gradually obtaining command over his horse, to demonstrate to the latter the utter futility of its attempt to get rid of him by running away, and that, too, without violence or severity. One single attempt at bolting away, if taken advantage of in this manner by a judicious rider, may prove the means of effectually subduing a troublesome animal. On the other hand, such a rider will abstain carefully from driving his horse to running away.

It is more difficult to manage a horse that runs away on the roads or in the streets of a town, because the rider is more or less compelled to follow straight lines.

He can, however, unless the road be very narrow indeed, by using the rein and leg at each side *alternately*, compel the runaway to move on a serpentine, which is nothing more nor less than a series of curves alternating to the right and left, which will also enable him to clear dangerous corners; one of these, indeed, if well taken, may possibly afford him an opportunity of gaining the mastery; in fact, it will be found that most runaways are stopped after turning a corner.

The especial management of the horse's head will, of course, in all cases, depend on whether it is carried too high or too low: if the former, the object will be to get it down; if the latter, to get it up. The presumption being that the horse that runs away with its head up has no special defect in the hind quarters or legs, the rider may attack these more energetically, which requires his own leg to be in the right place, and the horse's head to be brought round somewhat to the same side. Now, although a dead pull downwards with both reins together will seldom bring the head down, an intermittent pull on one rein will bring it to one side, after which it will come down, the horse not being then able to stiffen its neck at both sides. With the horse that carries its head too low, the presumption being to the contrary of what is stated above, the rider must use his own legs more cautiously, and whilst he endeavours to bend the horse's head to one side with one rein, he will try to work it *upwards* with the other. This, of course, must be done with the bridoon if the horse be bitted, otherwise with the snaffle-rein; indeed, it will be found that bringing the bit and bridoon alternately into action is preferable to using them simultaneously. It should be scarcely

necessary to add, that the rider's weight must be always thrown somewhat into the stirrup at the side you wish to turn the horse towards, which is difficult when the stirrups are hung very far from the seat.

Bucking or Plunging. — In bucking, the horse gathers its legs under its body, puts its back up and its head down, and then commences a series of seesaw movements, throwing itself from the hind to the fore legs in rapid succession, either without moving forwards, or in a succession of bounds, which latter, however, is more properly plunging. It occurs usually with young horses, and is much less common with English ones than with some foreign breeds, especially the Russian steppe horses. Sometimes very tight girthing, or too heavy a load on the horse's back, will cause it to buck; or the attempt to screw it up too suddenly into school form. The best method of handling young horses that have acquired this vice is on the lounge with the dumb-jockey, the great object being to get them to move forwards, and prevent the head coming down. As the bucking or plunging usually commences when the horse is put into a trot, it should be kept as long as possible at a walk on the circle, which is best effected by letting a man go alongside its head, holding the bridle, if necessary. The reins should not be buckled tight, as "forcing" a bucker will often make it throw itself down, or rear up and fall back. For the same reason, if it does begin to buck, just let it tire itself out, and when it is well wearied, one or two smart blows of the whip applied *under its chest* by the assistant will make it go ahead and thus, by degrees, it will give up the habit.

If a horse takes to bucking or plunging under the

rider, his object should be to make it go ahead by a few smart strokes of the whip on the shoulders, even at the risk of its running away, which he can meet in the manner described above; and this will even give him an opportunity of getting the head up, by first bending the neck to one side. It is, of course, absurd to sit far back on a bucker, sticking out the legs in front; a man that does so will be shot off over the horse's ears at the first or second plunge. The seat must be central, and the rider's back as straight as possible, although the natural tendency is to round it; the rider's weight, too, must be thrown "into his heels," right under his seat; this is the only chance of "sitting out a bucker."

Rearing is the most dreaded form of vice that occurs, and therefore the dodge that cunning horses resort to most frequently, as they at once perceive that the rider is afraid of it. Still it is by no means so difficult to conquer effectually as is generally supposed; no doubt a very courageous and cool-tempered rider alone can hope to succeed.

Rearing would occur much less frequently if it were well understood that it is almost always the last stage of disobedience, and very seldom if ever the first. In fact, its occurrence is evidence of injudicious management of some kind, either from untrained horses being brought into positions for which they are as yet unfitted; or from something being demanded of them that was beyond their power; or from the rider not knowing how to recognise and subdue the very first symptoms of disobedience; or, finally, from his using violent and intemperate methods of doing so.

We have already pointed out how bad management

of a backing or bucking horse may end in rearing; but bringing a remount, or sometimes even an old horse, into the company of other horses, and then trying to get it away against its will, will often do the same; or wanting to force a horse over a jump it does not like, &c., &c. Now, let us see what a horse does with itself immediately before it actually does rear up. The rider is perhaps just congratulating himself how nicely he is getting along, when all of a sudden he feels as if the horse had collapsed under him; *his* seat is "nowhere;" its head or mouth has shrunk away from the feeling on the mouthpiece, and it has got its legs under its body, and is come to a dead stand-still—the rider usually, unless his seat be correct, falling forward with his body, which of course makes matters worse. Then most riders will give a great dig with their heels or spurs just anywhere they can get at the horse, or perhaps a blow with their whip, whereupon the animal elevates itself on its hind legs, and becomes a rearer. If the spurs, or even the whip, had been applied in proper time—that is to say, before the horse came to a stand-still—there would have been some use in them, and it would probably never have come to rearing at all. But if a man's legs are spread far away from the horse's sides, and he thinks proper not only to dangle his reins, but to sit with his back rounded in the so-called "knowing fashion," he will then have no "feeling in his seat," and is consequently quite ignorant of what his horse is *going to do*, and of course must come too late with both spurs and whip, if he happened to possess these implements. An immense majority of rearers learn this vice when being ridden about in a slovenly manner by young riders or grooms; a man that keeps a lively feel

of his horse with both his hand and heels, and pays attention to the play of its ears and to every variation of its pace, will seldom if ever let it come to rearing, because the moment he detects the least slackness he will at once apply the proper remedy, which will be to make the horse come up to the mouthpiece at once; but then his own legs must be well closed up to enable him to do so.

If you have ascertained that the trick of rearing was first practised somewhat after the manner described above, you may very reasonably hope to cure your horse without much difficulty. The animal must be *led*, ready saddled and bridled, into a riding-school, or some enclosed space of convenient dimensions, in order to avoid giving it an opportunity for attempting disobedience on the way thither. The rider will then mount, and begin by riding quietly round about at a walk, not as if he were merely wanting to see whether the horse would rear or not, but with the very distinct idea constantly before his eyes of getting it in the first instance well up to the mouthpiece, so as to have a firm leaning, recollecting always that this will depend quite as much on his own legs as on those of the horse; after which he will proceed to correct the carriage or "form" of the animal in the way described in the introductory chapter to Part IV., halting occasionally, bending the neck and head; and, finally, when he finds that he *has* got a hold of his horse between his own legs and the reins—that is to say, feels that *he* is the regulator of the steed's movements at a walk—he may urge it gradually into whatever trot it pleases to go itself, and subsequently bring it into the form he himself pleases n fact, he will re-train it till it is in

perfect obedience, when there will be no more danger of its rearing, under a *good* rider at least.

Should the horse, during this period of training, "try on" his old tricks, the rider must be prepared for it, watching its movements attentively, and especially all slackening or cringing in its paces, which should be promptly attacked, though not roughly. Acting merely on the defensive is quite out of place in handling vicious horses; one must meet them boldly. One or two promptly-administered cuts of the whip over the shoulders will frequently nip any renewed attempt at rearing in the bud. With all restive horses, but more especially with rearers, it is essential that the regular seat should not be in the least disturbed by the necessity for using either whip or spur. A seat that may do admirably well for riding a willing horse over the stiffest country in England, may be perfectly useless for the sort of work described here.

Horses that have become confirmed rearers, and frequently thrown themselves back with the rider, will require great caution, and must be handled in a somewhat more methodical manner, though still on the same principle. We have shown what the horse does when it is preparing to rear; let us now for a moment look at it in the act of rearing. After slinking away from the rider's hand and seat, so that he loses all hold of it, the animal suddenly stiffens its hocks, throwing its whole weight on them, and at the same moment stiffens also its neck, and especially the throat, somewhat in the position shown by the upper horse in fig. 7, so that it becomes quite impossible to get a downward pull at it, and thus defies the rider most completely. It is always the same story—stiffened hocks and a stiff

neck.* The safest way of managing confirmed rearers is on the lounge, *without* the dumb-jockey, which would be very likely to injure the horse severely in case of its throwing itself back. Of course the reader will at once perceive that the general plan of treatment will consist in getting the animal to bend its hocks and neck in the manner already described above; and we may therefore confine our observations here to what should be done when it actually does rear, which will be usually at the moment one attempts to put it into a trot on the circle; for which reason bending lessons, when halted or at a walk, must be persevered in at first. Supposing, now, the horse to be on the lounge, and suddenly to stop and rear up, the trainer, who must have an assistant that knows well how to use the whip, should shorten the line in coils in his left hand, holding it firmly in the right, just long enough to keep him clear of the horse's fore legs should it make a plunge forwards, and placing himself exactly opposite to the animal's head, so that, by stepping back a pace or two, he is sure to retain a good "feeling" on the line when its fore legs again touch the ground, the assistant with the whip stepping meanwhile smartly up behind the animal. The trainer should, in this position, merely keep a feeling on the line, as one would with a heavy salmon, never attempting to pull the horse's head forcibly downwards, or to jerk at the lounge, as the steady pull would only serve to make it lean on your hand and persist so much the longer in rearing, whilst a sudden

* In the English method of handling horses little attention is paid to the horse's hocks or neck; whilst, on the contrary, the pasterns are severely worked, which is precisely the reason why school methods must be employed for rearers.

drag is very likely to knock it over—a thing to be avoided if possible. One must wait patiently, watching attentively the horse's movements, and taking care always to preserve his own position, so as to be ready when the moment for action arrives. But the assistant with the whip should meanwhile deliver a few heavy deliberately-aimed blows on the animal's buttocks—not striking wildly, but taking care to hit one and the same spot repeatedly, and watching anxiously for the moment when the rearer shows signs of getting tired of standing on its hind legs, and is about to go down. This is the moment at which the last and most effective cut of the whip should be inflicted; and this, too, is the moment for the trainer to give a short sharp drag on the lounge downwards; and if the whip has been applied at the right moment, the horse will have been compelled to obey the lounge, the trainer's mastery will have been asserted, and if the horse ever again attempts to rear, during lounging, a very gentle pull of the cavesson on its nose reminds it of its previous defeat, and will probably insure obedience; if not, the lesson must be repeated in the same manner.

Should one or the other hind leg appear to be giving way, as often happens, whilst the horse stands erect, the trainer should give a good smart pull on the lounge to the same side, which will throw the animal flat on its side, instead of allowing it to fall on its back, which is always attended with danger. Sometimes, no doubt, a fall of the latter kind will cure the animal for ever; but it is better, for many reasons, that the horse, having lost the power of maintaining itself and offering further opposition to the trainer's will, should be compelled to take the inevitable fall in the direction *he* prescribes.

Most horses, when they do at length consent to bring their fore legs to the ground, especially if the whip has been vigorously applied at the proper moment, will make a sudden plunge forward, which is so much the better; the trainer must then step smartly to one side—the off one, if possible—and catch the horse cannily in mid-air with the lounge, handling it quickly and neatly, and taking especial care not to stumble into the slack coils in his left hand. This manœuvre, if well carried out, will afford complete mastery, and render the animal perfectly obedient once for all. All that remains to be done is to get the horse to stand still, the trainer shortening the lounge by degrees, and getting in front of the head, and the assistant placing himself behind the trainer's back, and putting his whip out of sight; then "make much" of the animal, give it a handful of oats or a bit of something nice, loosen the reins and girths, and send it back to the stable. Horses have excellent memories and sufficient intelligence to understand that they have been rewarded for obedience, and that their attempt at having their own way has failed. This is a main point to keep steadfastly in view with all restive animals: avoid getting defeated yourself, and be kind nd generous to the vanquished. Of course this would only be a first step in the cure; to make it perfect the horse must be re-trained or handled from beginning to end in the way already pointed out.

As it sometimes happens that a man is taken completely by surprise, a horse rearing that has never shown any previous symptoms of restiveness, it will be well to point out what should be done in such a case. It requires presence of mind and great coolness, also a really firm seat, wholly independent of the stirrups on

the one hand, and the reins on the other, to enable one to deal with a rearer; but the thing can be done, and without much danger, except on pavement or a slippery surface, where it is better not to attempt a contest. When the horse stops with the intention of rearing, it first withdraws its mouth from the action of the reins by getting its head more or less into the position shown by the lower head, fig. 7; but when it begins to elevate itself on its hind legs, it assumes the exactly opposite position, shown by the upper head of the same figure, which, of course, equally enables it to defy the action of the mouthpiece. The advice usually given is to slacken the reins altogether; but this is simply "playing into the horse's hand," because *its* object is precisely to defeat the rider's hand, first by slinking away from it, and finally by resisting it openly. Evidently this advice is dictated by the apprehension that the rearing up of the horse, depriving the rider of the usual support of the *knees* and stirrups, will lead him to seek this in the reins, and so pull the horse over backwards; and no doubt this will prove correct for the great majority of riders.* But if a man sits to his saddle by his thighs, and has his own body in balance, there need be no such apprehension; and if he then has only presence of mind sufficient to preserve a feeling with the reins during the time the horse's head is passing from the position shown by the lower to that shown by the upper head, fig. 7, there will be a moment when it will be in the intermediate position (see fig. 6, middle head), and the animal's backbone will then also have

* The very fact of the horse ever getting the length of rearing is presumptive evidence of the rider's legs being in the wrong place at the time.

assumed an angle, not greater than 45 degrees, with the horizon; the hocks, therefore, will be still bent somewhat (refer to Plate I. and fig. 4 to realise the mechanism of the hind leg). This is the moment to screw both spurs as forcibly as possible into the horse's *sides*, the effect of which is, as we know, to bend the hocks, if the hand be held counter; therefore the animal will, in nine cases out of ten, make a plunge forward, and having preserved throughout a proper degree of feeling with the reins, the rider will be enabled to catch the horse in the air and bring it to the ground, so that the hind leg should touch this, if possible, a moment sooner than the fore ones, or at least so that they should get the greater part of the shock. This is in itself a very severe correction, and one that *good* school-riders apply with great effect, with other forms of insubordination, not hesitating even to provoke an attempt at rearing in order to have the opportunity; if it be well done it may perhaps suffice once for all.

It may, however, happen that the horse has contrived to stick out its head (top one, fig. 7) and stiffen its hocks completely, so as to enable it to stand upright *before* the rider has made up his mind what to do. Well, even then the game is not lost, if only the rider has a seat and patience to wait, just as in the lounging process, till he feels his steed coming down out of the clouds, which it is sure to do some time or another, when, if his hands and legs are right, he will be ready to act as described in the preceding paragraph on the horse getting down to 45 degrees. In case the rider finds the horse actually falling, either directly backwards or to one side, let him throw himself off with a vigorous push of both hands so as to get clear.

This we have done ourselves more than once; but the trainer misses an opportunity by being driven to this extremity.

Kicking.—There is a difference between kicking and kicking. One horse will kick in harness, and not under a rider; another will do just the reverse. The former is probably extremely ticklish and sensitive to anything coming in contact with its hind quarters; mares are frequently so, especially in spring. The latter will probably have some weakness in the loins or hind quarters that is rendered painful when weight is put on its back. When this vice proceeds from natural causes of this description, there is no help for it but to employ the horse in whichever way it is content to do its work quietly. Again, one horse will kick at the spurs, another at the whip; of course the exciting cause, whatever it be, must be avoided.

But something *can* be done with young horses that simply take to kicking during the handling; very frequently the trainer has made some mistake, or been in too great a hurry, or put the saddle too far back, or girthed the animal too suddenly or too tightly. All this should be, in the first place, well inquired into and ascertained, and the vice will disappear with its exciting cause. There are, however, some young ones that take to kicking simply because they don't choose to go. These should be put on the lounge *with* the dumb-jockey, which will prevent their getting their heads *down*, what a kicking horse always attempts to do. If the horse stops on the circle and begins to kick, the trainer should proceed precisely in the same manner as with the rearer—that is, after shortening the lounge, and placing himself in front of the animal, sim-

ply wait patiently. Meanwhile the assistant with the whip must place himself behind the kicker, and holding a sufficiently long whip in readiness, wait till the horse has extended its hind legs to their utmost stretch. *This is the moment* to apply a good stroke of the lash just under the animal's belly, taking care never to hit the hind legs, nor to strike at all except at the moment these are fully extended. The effect is perfectly astounding, and a few well-delivered strokes will generally make the kicker only too anxious to get away from the whip and go ahead quietly. Some horses will, however, when baffled in this way, cease kicking, but still refuse to move forward. The trainer must then proceed to "unfix their feet" in the manner described in Chapter II. Part IV., or make them rein back gradually. Other horses will perhaps take to "running" backwards. All one can then do is to follow them quietly, merely keeping their heads straight, so that they should not run up against a wall or the like, but always taking care not to press so heavily on the lounge as to throw the animal's weight *on* the fore legs, as this, of course, will be a good opportunity to renew the kicking. When the horse gets tired of backing it will stop of its own accord. This moment must be attentively watched for by the assistant with the whip, who should then "pitch in" a dexterous stroke under the belly, and this will generally suffice to get the animal to go forwards.

In conclusion, it cannot be too strongly impressed on the minds of those who undertake to handle restive horses, that very little can be done by main force, nothing at all by cruel or even severe treatment, whereas

everything may be fairly hoped from patience, judgment, and kindness. It is especially in this department of riding that the truth of our Horatian motto, "Vis consili expers mole ruit sua," verifies itself. One can almost fancy that the passage was suggested to the Latin poet by having seen some Roman roughrider dragging a rearing horse over on himself.

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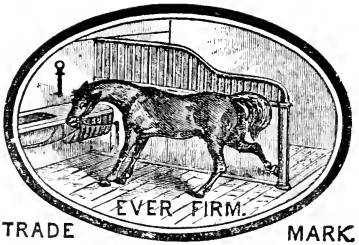

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